

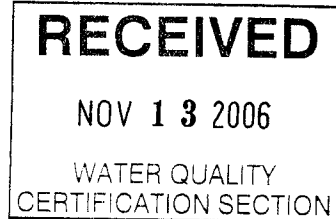


TRANSPORTATION CABINET

Frankfort, Kentucky 40622
www.kentucky.gov

Ernie Fletcher
Governor

November 8, 2006



AI #75633

Bill Nighbert
Secretary

Marc Williams
Commissioner of Highways

Division of Water
Water Quality Certification Section
Attn: Jenni Garland, Supervisor
14 Reilly Road
Frankfort, Kentucky 40601

SUBJECT: Section 401 - Water Quality Certification
Madison County, Item No. 7-192.20
Berea Bypass, Section 2

Dear Ms. Garland:

Submitted is an application for a Water Quality Certification for the above referenced project. This project concerns the construction of 4.6 miles of the Berea Bypass, from US25 to KY21. An application has been submitted to the Louisville District, Corps of Engineers, for consideration of a Nationwide Permit. The project will involve the construction of one new bridge and a bridge replacement over Silver Creek, the placement/replacement of several culverts, and impacts to ten small wetland areas.

There are crossings involving eleven blue-line streams. Seven crossings have stream impacts over 200' in length (Sites 5, 6, 10, 14, 19, 21, 30), but only three (Sites 10, 21, 30) have impacts over 200' in a watershed greater than 250 acres. Mitigation for those three impact sites will be handled by payment of an in-lieu fee. The wetland impacts, individually or collectively, are less than one acre; so mitigation is not required.

Enclosed find a completed application, vicinity map, plans and drawings of each impact site, and stream assessments for the three sites requiring mitigation. If you have any questions, please contact Roy Collins at (502) 564-7250.

Sincerely,

Roy C. Collins, III
Permits Coordinator
Division of Environmental Analysis

Enclosures

Cc: James Ballinger

Phil Logsdon

Dave Heil

Roy Collins

Files

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES & ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER

APPLICATION FOR PERMIT TO CONSTRUCT ACROSS OR ALONG A STREAM
AND / OR WATER QUALITY CERTIFICATION

Chapter 151 of the Kentucky Revised Statutes requires approval from the Division of Water prior to any construction or other activity in or along a stream that could in any way obstruct flood flows or adversely impact water quality. If the project involves work in a stream, such as bank stabilization, dredging or relocation, you will also need to obtain a 401 Water Quality Certification (WQC) from the Division of Water. This completed form will be forwarded to the Water Quality Branch for WQC processing. The project may not start until all necessary approvals are received from the KDOW. For questions concerning the WQC process, contact John Dovak at 502/564-3410.

If the project will disturb more than 1 acre of soil, you will also need to complete the attached Notice of Intent for Storm Water Discharges, and return both forms to the Floodplain management Section of the KDOW. This general permit will require you to create and implement an erosion control plan for the project.

1. OWNER: Kentucky Transportation Cabinet, Division of Environmental Analysis
Give name of person(s), company, governmental unit, or other owner of proposed project.
MAILING ADDRESS: 200 Mero Street, 5th Floor
Frankfort, KY 40622
TELEPHONE #: 502-564-7250 EMAIL:
2. AGENT: Roy C. Collins, III; Permit Coordinator
Give name of person(s) submitting application, if other than owner.
ADDRESS: Same as above
TELEPHONE #: 502-564-7250 EMAIL: RoyC.Collins@ky.gov
3. ENGINEER: P. E. NUMBER
Contact Division of Water if waiver can be granted
TELEPHONE #: EMAIL:
4. DESCRIPTION OF CONSTRUCTION: This project concerns the construction of 4.6 miles of the Berea Bypass, from US25
Describe the type and purpose of construction and describe stream impact
to KY21. It requires two new bridges over Silver Creek, the placement/replacement of numerous culverts, and will impact
several small wetland areas. There are eleven "blue-line" streams that will be crossed. Seven sites involve impacts greater
than 200' in length, but only three sites should require mitigation (drainage areas greater than 250 acres). The wetland
Impacts do not exceed 1.0 acres (individually or collectively), so wetland mitigation should not be required.
5. COUNTY: Madison NEAREST COMMUNITY: Berea
6. USGS QUAD NAME: Berea LATITUDE/LONGITUDE: N37-35-38, W84-15-25 (Site 10)
7. STREAM NAME: Silver Ck., East Fork, and UT's WATERSHED SIZE (in acres): 897 (#10), 289 (#21), 489 (#30)
8. LINEAR FEET OF STREAM IMPACTED: Site 10 -256', Site 21-437', Site 30-304'
9. DIRECTIONS TO SITE: Traveling south on I-75 from Lexington, take Exit 76 to head east on KY21. Proceed east for
Approximately 2.7 miles to the KY21/KY1617 (Blue Lick Road) intersection. This is the ending point for the Bypass. Around
1 mile of KY21 will be reconstructed in this area. To follow the Bypass construction, proceed north from the intersection over-
land, crossing Johnson Road, then turn northwesterly. The roadway will cross KY1016, KY3376 and have its beginning point
at US25 near its crossing with Silver Creek.

10. IS ANY PORTION OF THE REQUESTED PROJECT NOW COMPLETE? ☐ Yes ☒ No If yes, identify the completed portion on the drawings you submit and indicate the date activity was completed. DATE _____
11. ESTIMATED BEGIN CONSTRUCTION DATE: _____ May 2007
12. ESTIMATED END CONSTRUCTION DATE: _____ May 2009
13. HAS A PERMIT BEEN RECEIVED FROM THE US ARMY CORPS OF ENGINEERS? ☐ Yes ☒ No If yes, attach a copy of that permit. Nationwide Permit Application has been submitted.
14. THE APPLICANT MUST ADDRESS PUBLIC NOTICE
- (a) _____ Public notice in newspaper having greatest circulation in area (provide newspaper clipping or affidavit)
_____ Adjacent property owner(s) affidavits (Contact Division of Water for requirements.)
- (b) ☒ I REQUEST WAIVER OF PUBLIC NOTICE BECAUSE: This is a state project, public meetings and notices have already taken place during the initial environmental assessment process.
Contact Division of Water for Requirements.
15. I HAVE CONTACTED THE FOLLOWING CITY OR COUNTY OFFICIALS CONCERNING THIS PROJECT:
N/A
Give name and title of person(s) contacted and provide copy of any approval city or county may have issued.
16. LIST OF ATTACHMENTS: _____
List plans, profiles, or other drawings and data submitted. Attach a copy of a 7.5 minute USGS topographic map clearly showing the project location.
Vicinity Map, Plans and drawings for each impact site
Floodplain/floodway Analysis
Stream Assessment Sheets, Wetland Report
Mitigation Discussion
17. I, _____ (owner) CERTIFY THAT THE OWNER OWNS OR HAS EASEMENT RIGHTS ON ALL PROPERTY ON WHICH THIS PROJECT WILL BE LOCATED OR ON WHICH RELATED CONSTRUCTION WILL OCCUR (for dams, this includes the area that would be impounded during the design flood).
18. REMARKS: _____ This project is exempt from the provisions of KRS 151.250.

I hereby request approval for construction across or along a stream as described in this application and any accompanying documents. To the best of my knowledge, all the information provided is true and correct.

SIGNATURE: 
Owner or Agent sign here. (If signed by Agent, a Power of Attorney should be attached.)

DATE: 11/8/06

SIGNATURE OF LOCAL FLOODPLAIN COORDINATOR: _____

Permit application will be returned to applicant endorsed by the local floodplain coordinator.

DATE: _____

SUBMIT APPLICATION AND ATTACHMENTS TO:

Floodplain Management Section
Division of Water
14 Reilly Road
Frankfort, KY 40601



Kentucky Transportation	BEREA BYPASS			STREAM:	
	COUNTY: MADISON	STATE: KENTUCKY	STA 107+00 - STA 119+00	ITEM: 7-192.20	VICINITY MAP

SUMMARY OF SECTION 404 IMPACTS

Item No. 7-192.20

(All stations are Mainline unless otherwise indicated; also note that no Special Aquatic Site were found on this project)

1. Sta. 115+25 – Construct a six span bridge over Silver Creek (Reach 2), a **perennial** stream. **No permanent impact** to the waters is anticipated. A temporary low-water crossing may be utilized during construction (a typical drawing is enclosed). The crossing and pipe openings will be configured to pass a 2-year storm without overtopping, checked for a 5-year to assure that no increase in the water surface will damage adjoining property, and the disturbed area will be returned to pre-construction contours. The drainage area affected is **22.13 sq.mi.** This site is located at N37-35-57, W84-16-39. (Nationwide Permit No. 33)
2. Sta. 126+21 – Construct 177' of pipe culvert, with 20' of inlet and 32' of outlet channel improvements; on an **ephemeral/perennial** tributary (Reaches 4US and 4DS, respectively) to Silver Creek. Additionally, fill an **ephemeral** tributary (Reach 5) and a **0.04 acre wetland** (Wetland A). This replaces **259'** of ephemeral and **171'** of perennial channel. The impact to waters **0.04 acres** of wetlands, **0.003 acres** of ephemeral and **0.012 acres** of perennial. The drainage area affected is **74.4 acres**. The site is located at N37-35-51, W84-16-29. (Nationwide Permit No. 14)
3. Sta. 134+65 – Construct 202' of pipe culvert, with 25' of inlet and 30' of outlet channel improvements; on an **ephemeral** tributary (Reach 6) to Silver Creek. This replaces **311'** of existing channel. The impact to waters is **0.003 acres**. The drainage area affected is **23.0 acres**. The site is located at N37-35-46, W84-16-19. (Nationwide Permit No. 14)
4. Sta. 154+40 – Construct 176' of pipe culvert, with 270' of inlet and 219' of outlet channel improvements; on an **ephemeral** tributary (Reach 11) to Terrill Branch. This replaces **584'** of existing roadside channel. The impact to waters is **0.007 acres**. The drainage area affected is **11.5 acres**. The site is located at N37-35-39, W84-15-57. (Nationwide Permit No. 14)
5. Right Sta. 155+16.47 (KY 3376, Sta. 7+47) – Construct 153' of 8'X 4' box culvert, with 10' of inlet and 40' of outlet channel improvements; on a **perennial** tributary (Reach 12 DS) to Terrill Branch. This replaces **243'** of existing channel (including 25' of existing box culvert). The impact to waters is **0.022 acres**. The drainage area affected is **127.2 acres**. The site is located at N37-35-39, W84-15-57. (Nationwide Permit No. 14, WQC)
6. Sta. 157+43 – Construct 209' of 8'X 4' box culvert, with 10' of inlet and 40' of outlet channel improvements; on a **perennial** tributary (Reach 12US) to Terrill Branch. This replaces **271'** of existing channel. The impact to waters is **0.019 acres**. The

drainage area affected is **109.8 acres**. The site is located at N37-35-40, W84-15-54. (Nationwide Permit No. 14, WQC)

7. Left Sta. 173+46 (KY 1016, Sta. 14+26) – Construct a 46' upstream and a 28' downstream extension on an existing 9'X 4' box culvert; with a 10' inlet and a 45' outlet channel improvement. This is on a **perennial** tributary (Reach 15US) to Terrill Branch. This replaces **135'** of existing channel. The impact to waters is **0.009 acres**. The drainage area affected is **102.6 acres**. The site is located at N37-35-38, W84-15-31. (Nationwide Permit No. 14)
8. Sta. 176+36 – Construct 132' of 10'X 4' box culvert, with 10' of inlet and 20' of outlet channel improvements; on a **perennial** tributary (Reach 15DS) to Terrill Branch. This replaces **184'** of existing channel. The impact to waters is **0.014 acres**. The drainage area affected is **123.3 acres**. The site is located at N37-35-34, W84-15-32. (Nationwide Permit No. 14)
9. Right Sta. 179+00 – Drain an **isolated 0.068 acre pond**, and fill **0.039 acres**. The drainage area affected is **3.0 acres**. The site is located at N37-35-32, W84-15-29. (Non-jurisdictional)
10. Sta. 183+97 – Construct 167' of double box culvert, with 20' of inlet and 30' of outlet channel improvements; on Terrill Branch (Reach 16), a **perennial** stream. This replaces **256'** of existing channel. The impact to waters is **0.029 acres**. The drainage area affected is **897.4 acres**. The site is located at N37-35-38, W84-15-25. (Nationwide Permit No. 14, WQC)
11. Sta. 190+00 – Drain and fill a **0.042 acre pond**, with **0.03 acres of wetlands** (Wetland B) and fill an **ephemeral** tributary (Reach 17) to Terrill Branch. This replaces the wetlands and **96'** of existing channel. The impact to waters is **0.03 acres** of wetlands and **0.001 acres** of ephemeral channel. The drainage area affected is **2.2 acres**. The site is located at N37-35-24, W84-15-21. (Nationwide Permit No. 14)
12. Left Sta. 194+00 to Right Sta. 195+93, and Left Johnson Shop Rd. Sta. 7+50 to Sta. 12+75 – Construct 84' of pipe culvert (Sta. 10+61, Johnson Shop Rd.), with 150' of inlet and 110' of outlet channel, ending at the inlet of the culvert at Sta. 197+81 (described below). This replaces **229'** of **ephemeral** tributary (Reach 18) and **529'** of an **ephemeral** roadside drainage channel (Reach 19) along Johnson Shop Road; which runs to a tributary of Terrill Branch. The total impact to waters is 0.011 acres (**0.005 acres** and **0.006 acres** respectively). The drainage area affected is **3.4 acres**. The site is located at N37-35-19, W84-15-19. (Nationwide Permit No. 14)
13. Sta. 197+81 – Construct 119' of pipe culvert, with 15' of inlet and 15' of outlet channel improvements; on an **ephemeral** tributary (Reach 20) to Terrill Branch. This replaces **166'** of existing channel. The impact to waters is **0.004 acres**. The drainage area affected is **21.0 acres**. The site is located at N37-35-17, W84-15-19. (Nationwide Permit No. 14)

14. Sta. 205+90 – Construct 162' of 8'X 4' box culvert, with 20' of inlet and 20' of outlet channel improvements; on a **perennial** tributary (Reach 21) to Terrill Branch. This replaces 241' of existing channel. The impact to waters is **0.028 acres**. The drainage area affected is **132.8 acres**. The site is located at N37-35-09, W84-15-20. (Nationwide Permit No. 14, WQC)
15. Sta. 207+60 – Fill **160'** of **ephemeral** tributary (Reach 22) to Terrill Branch. The impact to waters is **0.004 acres**. The drainage area affected is **1.0 acres**. The site is located at N37-35-07, W84-15-19. (Nationwide Permit No. 14)
16. Sta. 218+35 – Construct 237' of pipe culvert, with 20' of inlet and 20' of outlet channel improvement; on an **ephemeral** tributary (Reach 23) to Silver Creek. Additionally, place 32' of private entrance pipe downstream (no drawing). This replaces 320' of existing channel. The impact to waters is **0.007 acres**. The drainage area affected is **16.9 acres**. The site is located at N37-34-55, W84-15-21. (Nationwide Permit No. 14)
17. Left Sta. 222+00 – Drain an **isolated 0.134 acre pond**, with **0.020 acres of wetlands** (Wetland C). No connectivity with another water source was identified in the field. The drainage area affected is **0.4 acres**. The site is located at N37-34-52, W84-15-18. (Non-jurisdictional)
18. Right Sta. 224+50 – Drain an **isolated 0.049 acre pond**, with **0.020 acres of wetlands** (Wetland D). No connectivity with another water source was identified in the field. The drainage area affected is **0.2 acres**. The site is located at N37-34-51, W84-15-21. (Non-jurisdictional)
19. Sta. 241+04 – Construct 115' of double 6'X 5' box culvert, with 180' of inlet and 20' of outlet channel improvements; on a **perennial** tributary (Reach 26) and **intermittent** tributary (Reach 27) to Silver Creek. This replaces 348' of perennial and 50' of intermittent channel. The total impact to waters is 0.041 acres (**0.036 acres** and **0.005 acres**, respectively). The drainage area affected is **219.1 acres**. The site is located at N37-34-34, W84-15-20. (Nationwide Permit No. 14, WQC)
20. Sta. 250+50 – Fill a **0.20 acre wetland** (Wetland E) associated with drainage to a tributary of Silver Creek. The drainage area affected is **6.0 acres**. The site is located at N37-34-25, W84-15-22. (Nationwide Permit No. 14)
21. Sta. 253+14 – Construct 262' of double 8'X 5' box culvert, with 10' of inlet and 45' of outlet channel improvements; on a **perennial** tributary (Reach 29) to Silver Creek. Additionally, drain and fill a **0.068 acre pond** with **0.02 acres of wetlands** (Wetland F). This replaces 437' of perennial channel and 70' of **ephemeral** channel (assumed length through pond) and the wetlands. The impact to waters is **0.050 acres** of perennial, **0.002 acres** of ephemeral, and **0.020 acres of wetlands**. The drainage

area affected is **288.6 acres**. The site is located at N37-34-23, W84-15-18. (Nationwide Permit No. 14, WQC)

22. Sta. 264+31 – Construct 106' of pipe culvert, with 15' of inlet and 20' of outlet channel improvements; on an **intermittent** tributary (Reach 30) to Silver Creek. This replaces **169'** of existing channel. The impact to waters is **0.008 acres**. The drainage area affected is **24.8 acres**. The site is located at N37-34-11, W84-15-18. (Nationwide Permit No. 14)
23. Sta. 265+00 – Fill a **0.09 acre wetland** (Wetland G) associated with drainage to a tributary to Silver Creek. The drainage area affected is **7.3 acres**. The site is located at N37-34-10, W84-15-17. (Nationwide Permit No. 14)
24. Sta. 276+70 – Construct 115' of pipe culvert, with 15' of inlet and 15' of outlet channel improvements, on an **ephemeral** tributary (Reach 33) to Silver Creek. This replaces **199'** of existing channel. The impact to waters is **0.005 acres**. The drainage area affected is **37.8 acres**. The site is located at N37-34-00, W84-15-22. (Nationwide Permit No. 14)
25. Left Sta. 281+70 – Fill an **isolated pond** that is a **0.03 acre wetland** (Wetland H). No connectivity with another water source was identified in the field. The drainage area affected is **0.06 acres**. The site is located at N37-33-55, W84-15-23. (Non-jurisdictional)
26. Left Sta. 283+20 to Left Sta. 290+00 – Construct 124' of pipe culvert (KY21 Sta. 116+88.58), with 385' of inlet and 221' of outlet channel improvement; on an **ephemeral/intermittent** tributary (Reaches 34US and 34DS, respectively) to East Fork Silver Creek. Additionally, fill another **ephemeral** tributary (Reach 40) which runs along KY21 (KY21 Sta. 116+75 to Sta. 118+50). This replaces **642'** of existing ephemeral and **253'** of existing intermittent channel. The impact to waters is 0.023 acres (**0.013 acres** of ephemeral and **0.011 acres** of intermittent). The drainage area affected is **35.4 acres**. The site is located at N37-33-49, W84-15-25. (Nationwide Permit No. 14)

KY-21 Impacts

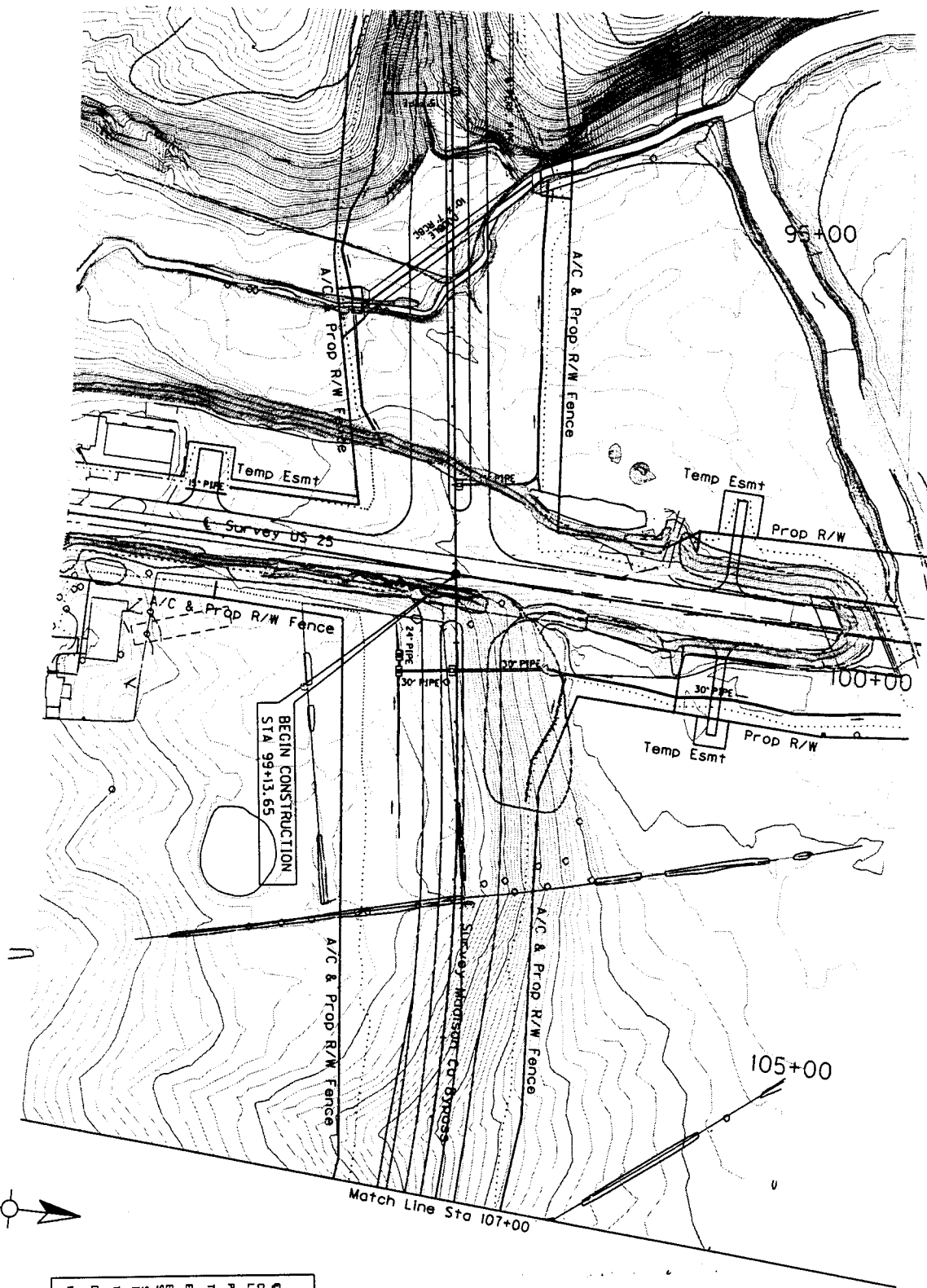
(Stations are left and right of Mainline Sta. 287+62.3)

27. Sta. 110+30 – Construct an 80' single span bridge at Silver Creek (Reach 39), a **perennial** stream. This replaces an existing bridge with 2-35' spans. The impact to waters is **0.037 acres**. A temporary low-water crossing may be utilized during construction (a typical drawing is enclosed). The crossing and pipe openings will be configured to pass a 2-year storm without overtopping, checked for the 5-year to assure that no increases in the water surface will damage adjoining property, and the disturbed area will returned to pre-construction contours. The drainage area affected

is **8.2 sq.mi.** The site is located at N37-33-50, W84-15-32. (Nationwide Permit No. 14)

28. Left Sta. 119+25 – Fill an **isolated 0.05 acre wetland** (Wetland I). No connectivity with another water source was identified in the field. The drainage area affected is **7.2 acres**. The site is located at N37-33-19, W84-15-23. (Non-jurisdictional)
29. Left Sta. 124+60 – Fill a **0.01 acre wetland** (Wetland J), connected to a roadside drainage channel for KY-21. The drainage area affected is **0.30 acres**. The site is located at N37-33-48, W84-15-15. (Nationwide Permit No. 14)
30. Sta. 129+75 – Construct 101' of 18'X 4' box culvert, with 90' of inlet and 35' of outlet channel improvements; on Davis Hollow, a **perennial** tributary (Reaches 42US and 42DS) to East Fork Silver Creek. Additionally, construct 65' of new channel for an **ephemeral** tributary (Reach 43). This replaces **304'** of perennial channel (including 64' of existing culvert) and **80'** of ephemeral channel. The total impact to waters is 0.037 acres (**0.035 acres** of perennial and **0.002 acres** of ephemeral). The drainage area affected is **489.4 acres**. The site is located at N37-33-46, W84-15-09. (Nationwide Permit No. 14, WQC)
31. Sta. 140+80 – Construct 123' of pipe culvert, with 30' of outlet channel improvement; on an **intermittent** tributary (Reach 45) of East Fork Silver Creek. This replaces **173'** of existing channel (including 39' of existing culvert). The impact to waters is **0.006 acres**. The drainage area affected is **50.2 acres**. The site is located at N37-33-37, W84-15-01. (Nationwide Permit No. 14)
32. Sta. 147+82 – Fill two **ephemeral** tributaries (Reaches 47 and 48) of East Fork Silver Creek. Flow will be redirected via 700' of roadside channel to the culvert at Sta. 140+80. This replaces 206' of existing channel (**112'** and **94'** respectively). The total impact to waters is **0.002 acres**. The drainage area affected is **5.6 acres**. The site is located at N37-33-32, W84-14-55. (Nationwide Permit No. 14)

STREAM: NO IMPACTS THIS SHEET



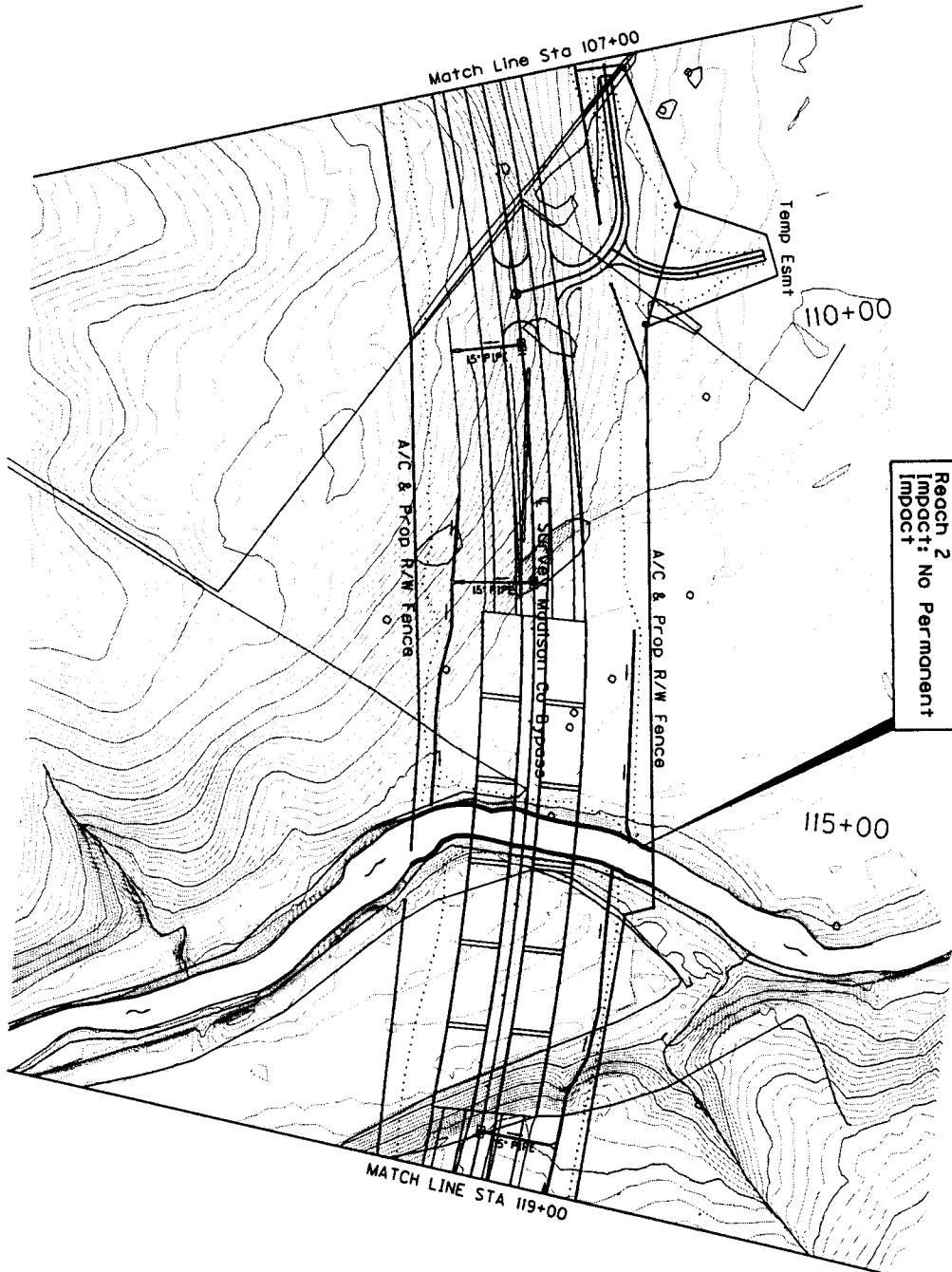
BEGIN CONSTRUCTION
STA 99+13.65

Match Line Sta 107+00

LEGEND

—	EXIST R/W
- - -	TEMP ESMT
—	PROP R/W
—	CONSTRUCTION LIMITS
—	SURVEY
—	WETLAND
—	DRAINAGE DITCH
—	TREES/SHRUBS
—	IMPACT
—	STREAM
—	EXIST

SCALE 1"=200'

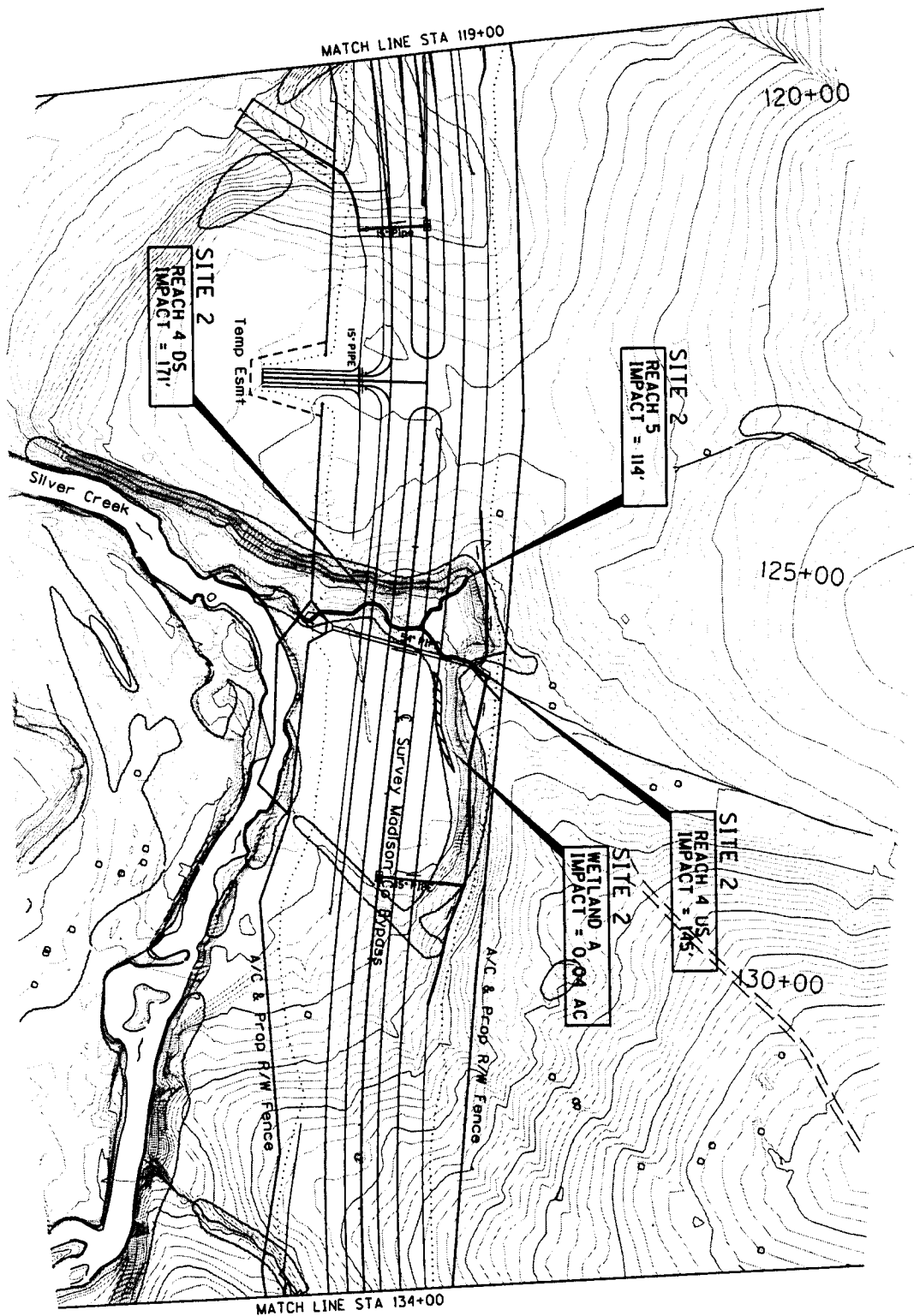


SITE 1
Reach 2
Impact: No Permanent
Impact

LEGEND	
—+—	SURVEY
—+—	CONSTRUCTION
—+—	LIMITS
—+—	PROP R/W
—+—	TEMP ESMT
—+—	EXIST R/W
—+—	EXIST STREAM
—+—	STREAM IMPACT
—+—	TREES/SHRUBS
—+—	DRAINAGE DITCH
—+—	WETLAND

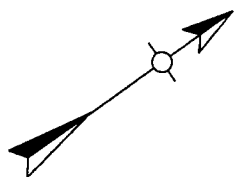


SCALE 1"=200'

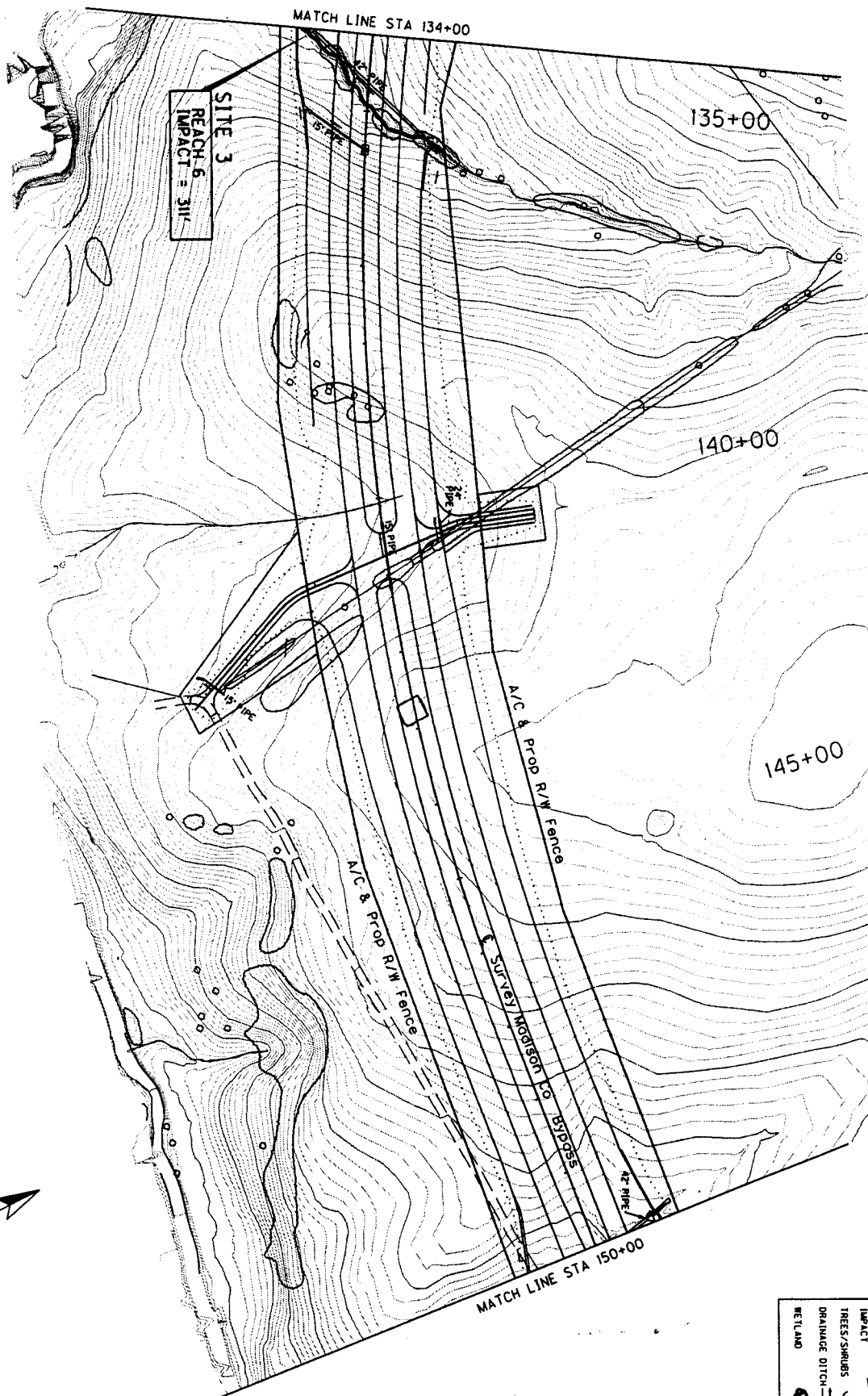


MATCH LINE STA 134+00

LEGEND	
	SURVEY CONSTRUCTION LIMITS
	PROP R/W
	TEMP ESMT
	EXIST R/W
	STREAM
	STREAM IMPACT
	TREES/SHRUBS
	DRAINAGE DITCH
	WETLAND

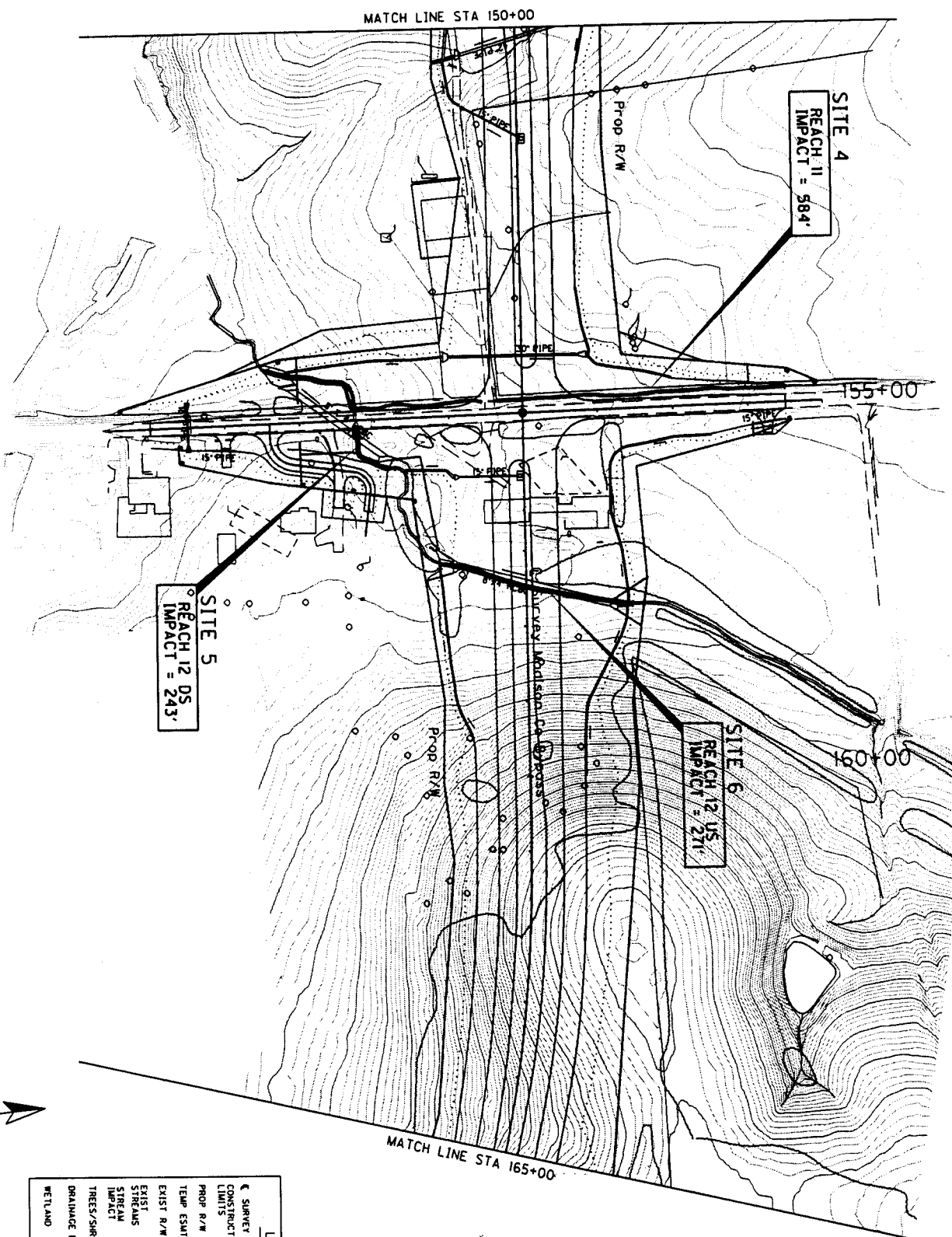


SCALE 1"=200'



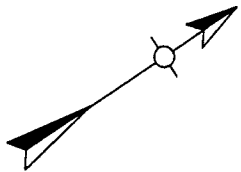
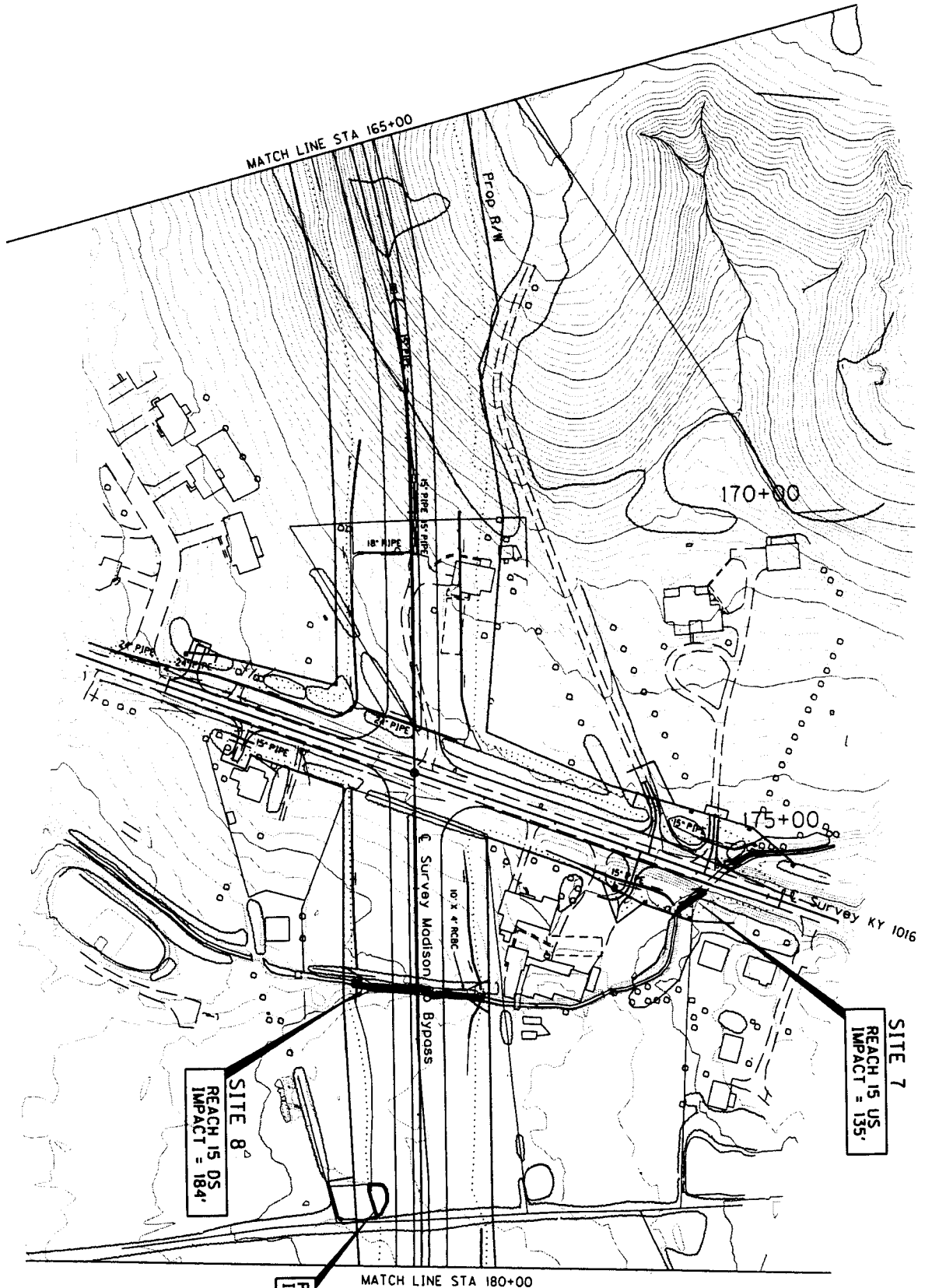
LEGEND	
—	SURVEY
---	CONSTRUCTION LIMITS
---	PROP R/W
---	TEMP ESMT
---	EXIST R/W
---	EXIST STREAM
---	STREAM IMPACT
---	TREES/SHRUBS
---	DRAINAGE DITCH
---	WETLAND

SCALE 1"=200'



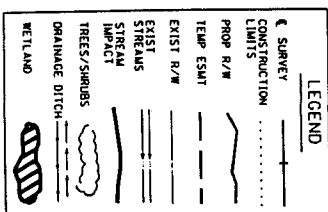
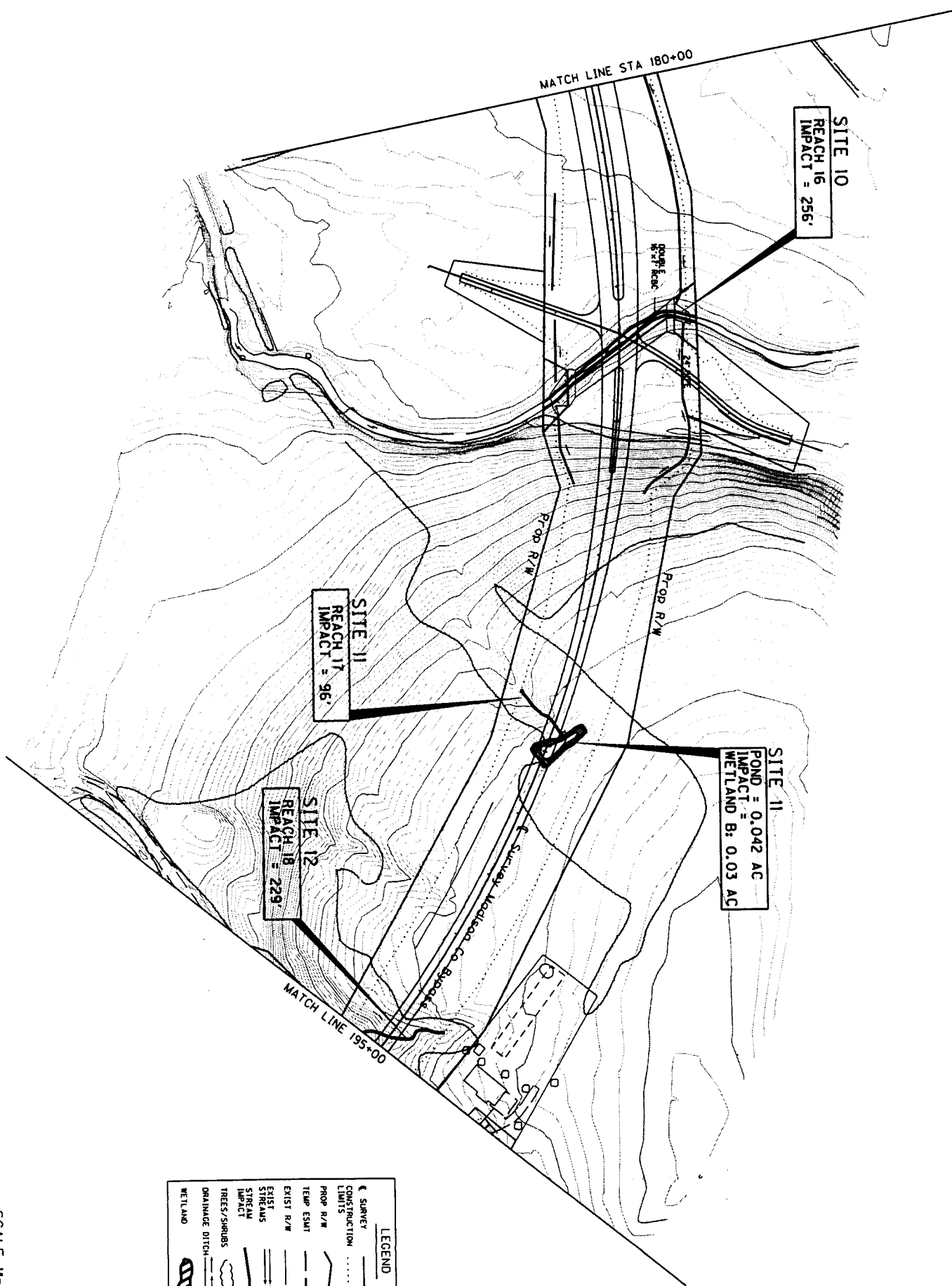
LEGEND	
	SURVEY CONSTRUCTION LIMITS
	PROP. R/W
	TEMP. ES&T
	EXIST. R/W
	STREAM
	STREAM IMPACT
	TREES/SHRUBS
	DRAINAGE DITCH
	WETLAND

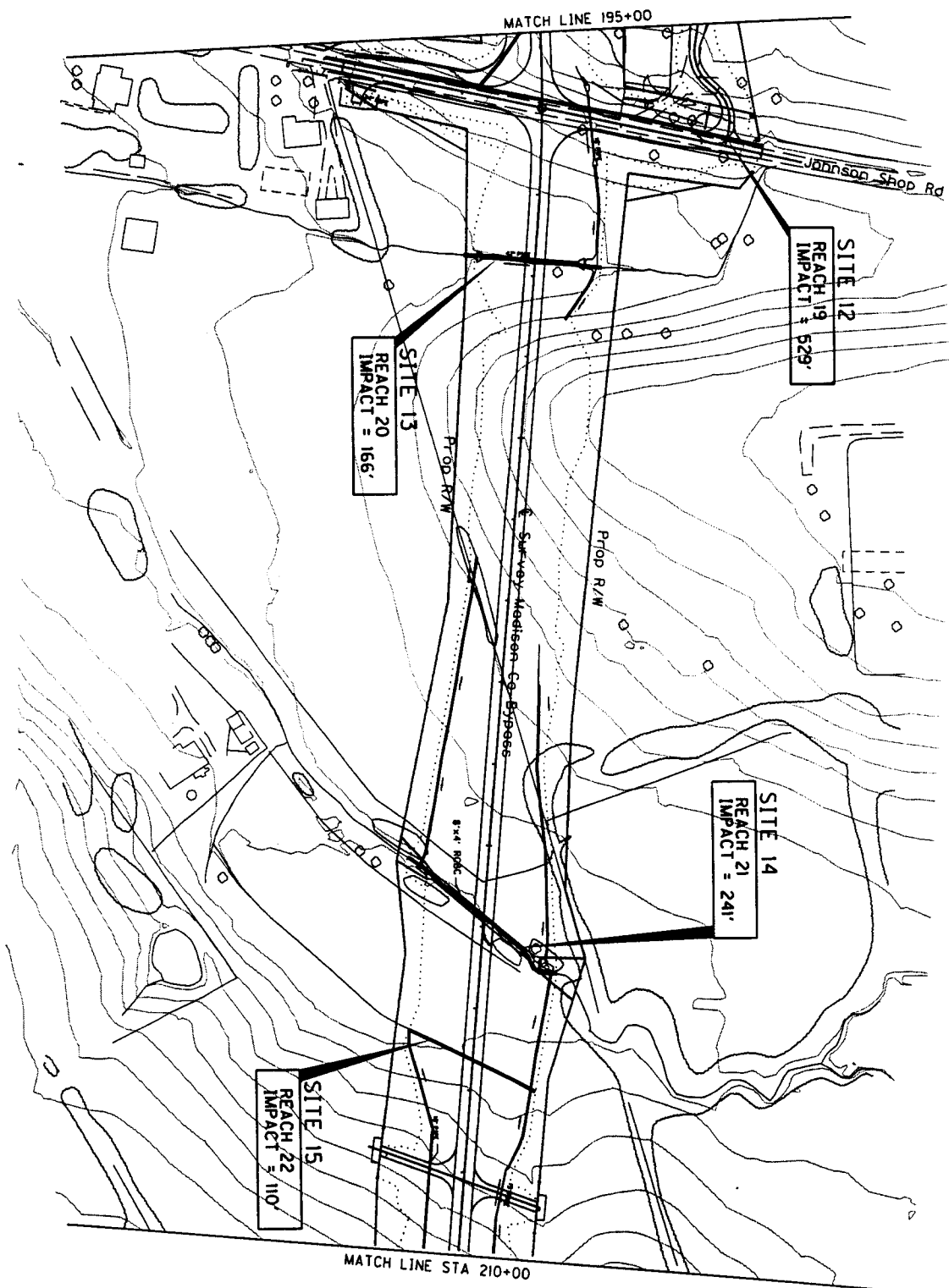
SCALE 1"=200'



SCALE 1"=200'

LEGEND	
—+—	E. SURVEY
—+—	CONSTRUCTION
—+—	LIMITS
—+—	PROP R/W
—+—	TEMP ESMT
—+—	EXIST R/W
—+—	EXIST STREAMS
—+—	STREAM IMPACT
—+—	TREES/SHRUBS
—+—	DRAINAGE DITCH
—+—	WETLAND

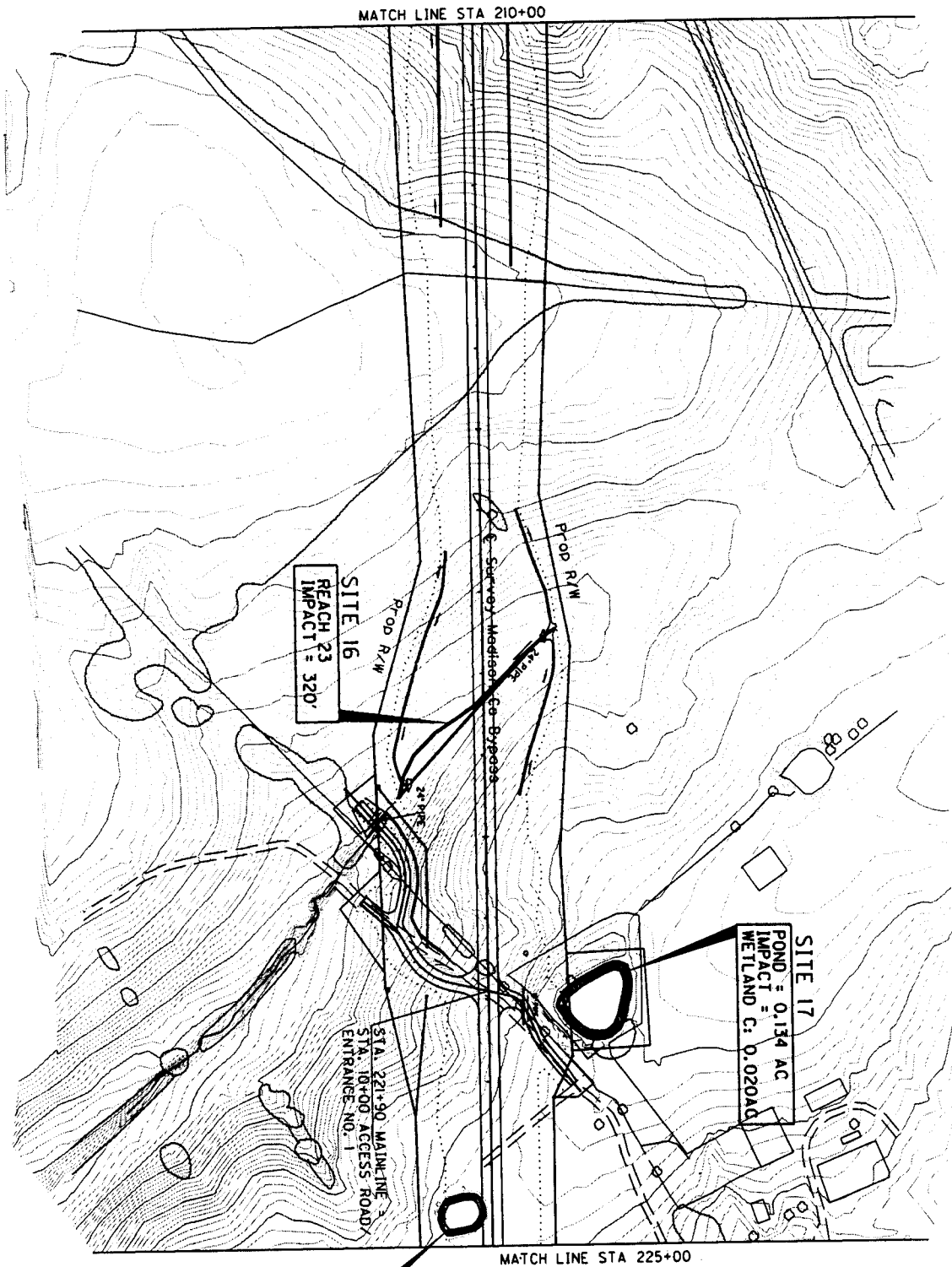




LEGEND	
—	SURVEY
—	CONSTRUCTION
—	LIMITS
—	PROP R/W
—	TEMP ESMIT
—	EXIST R/W
—	EXIST
—	STREAM
—	IMPACT
—	TREES/SHRUBS
—	DRAINAGE DITCH
—	WETLAND

SCALE 1"=200'

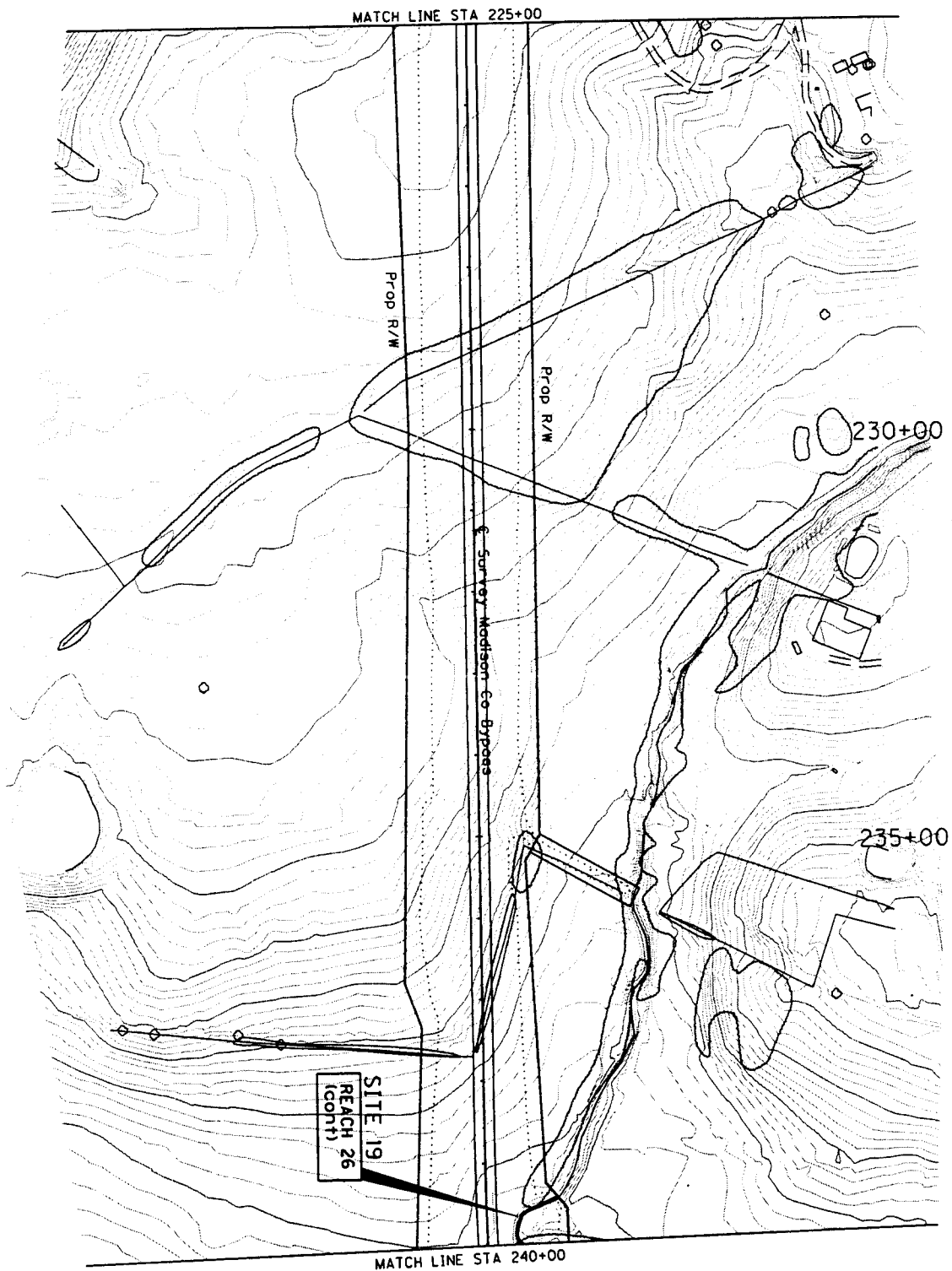
STREAM: UT of Silver Creek



LEGEND

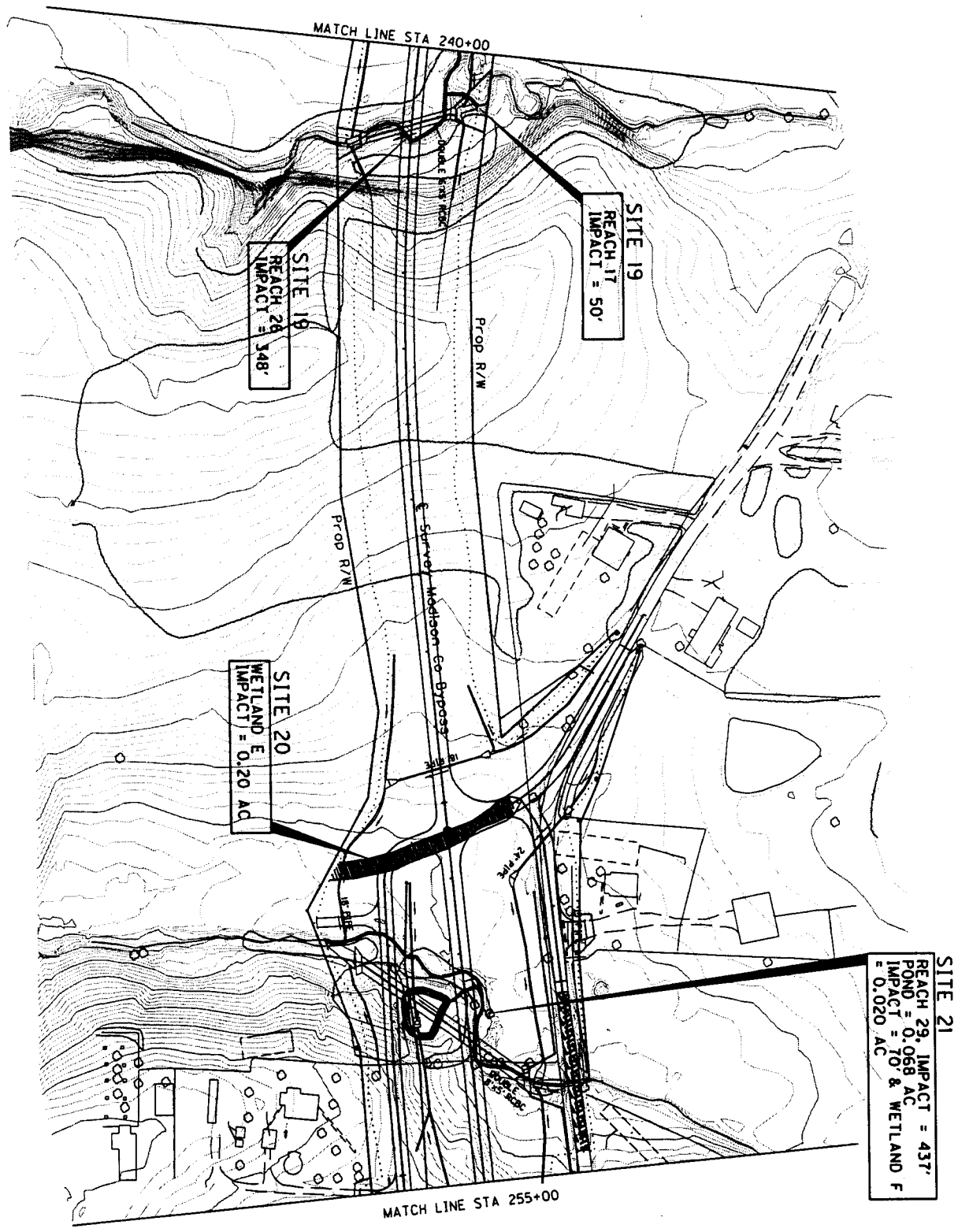
—	EXIST. SURVEY
—	CONSTRUCTION LIMITS
—	PROPOSED R/W
—	TEMP. ESWT
—	EXIST. R/W
—	EXIST. STREAMS
—	STREAM IMPACT
—	TREES/SHRUBS
—	DRAINAGE DITCH
—	WETLAND

SCALE 1"=200'



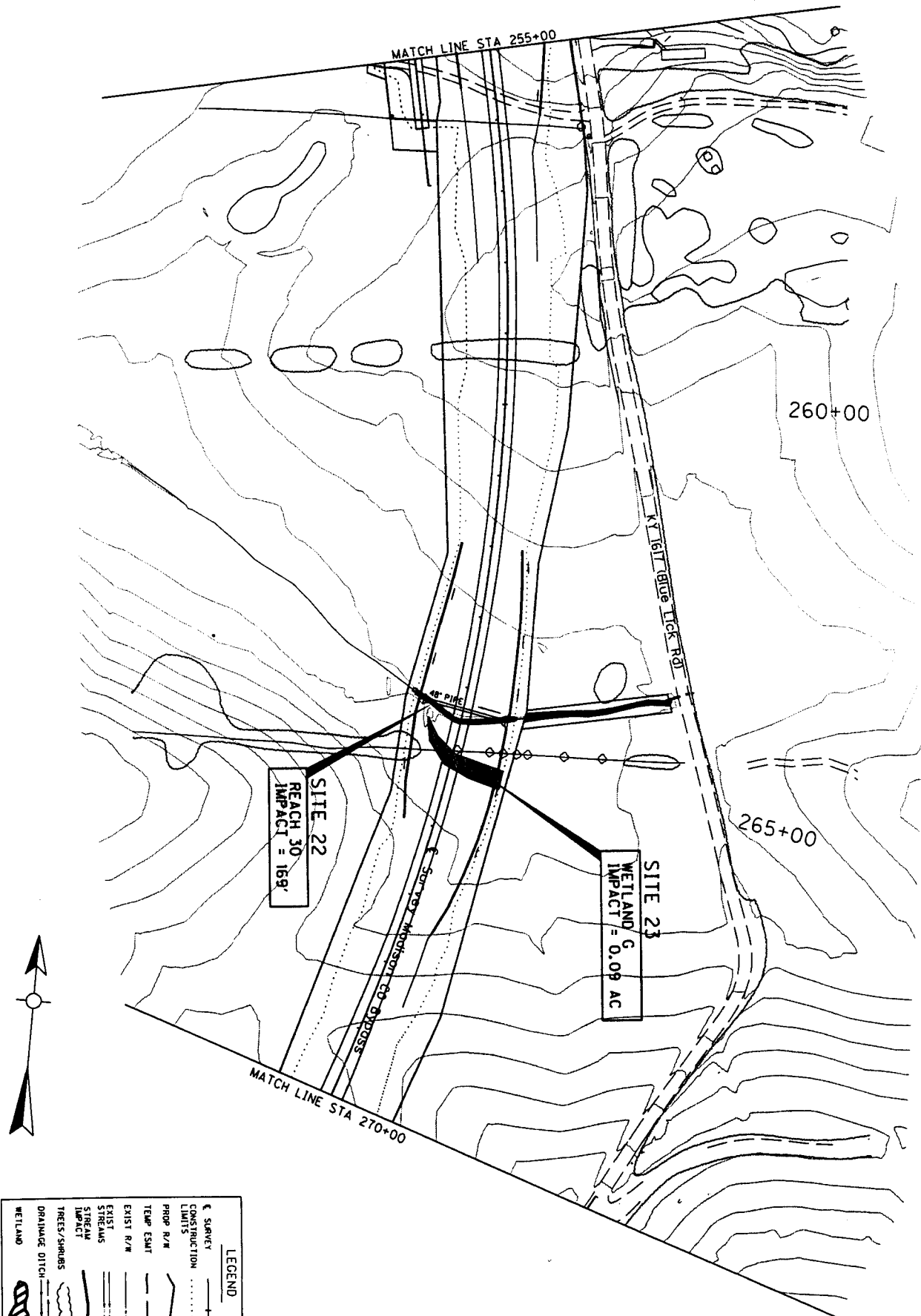
LEGEND	
—+—	SURVEY LIMITS
—+—	CONSTRUCTION LIMITS
—+—	PROPOSED R/W
—+—	TEMP ESENT
—+—	EXIST R/W
—+—	EXIST STREAM
—+—	STREAM IMPACT
—+—	TREES/SHRUBS
—+—	DRAINAGE DITCH
—+—	WETLAND

SCALE 1"=200'

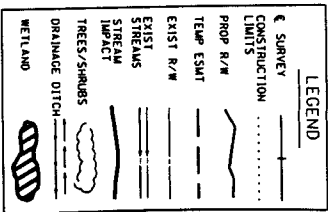


LEGEND	
—	UT SURVEY
—	CONSTRUCTION
.....	LIMITS
—	PROP R/W
—	TEMP ESWT
—	EXIST R/W
—	EXIST
—	STREAMS
—	STREAM
—	IMPACT
—	TREES/SHRUBS
—	DRAINAGE DITCH
—	WETLAND

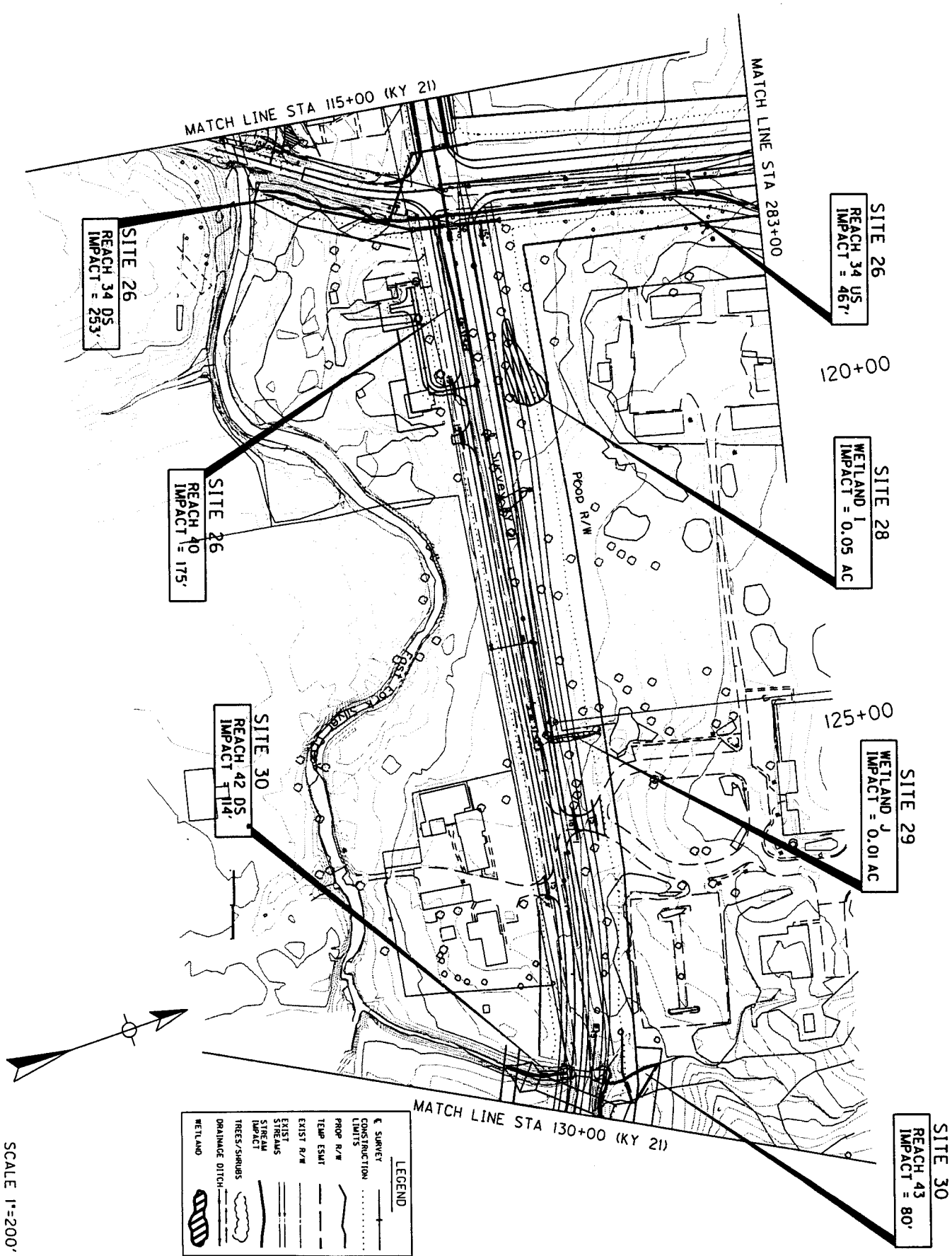
SCALE 1"=200'



SCALE 1"=200'



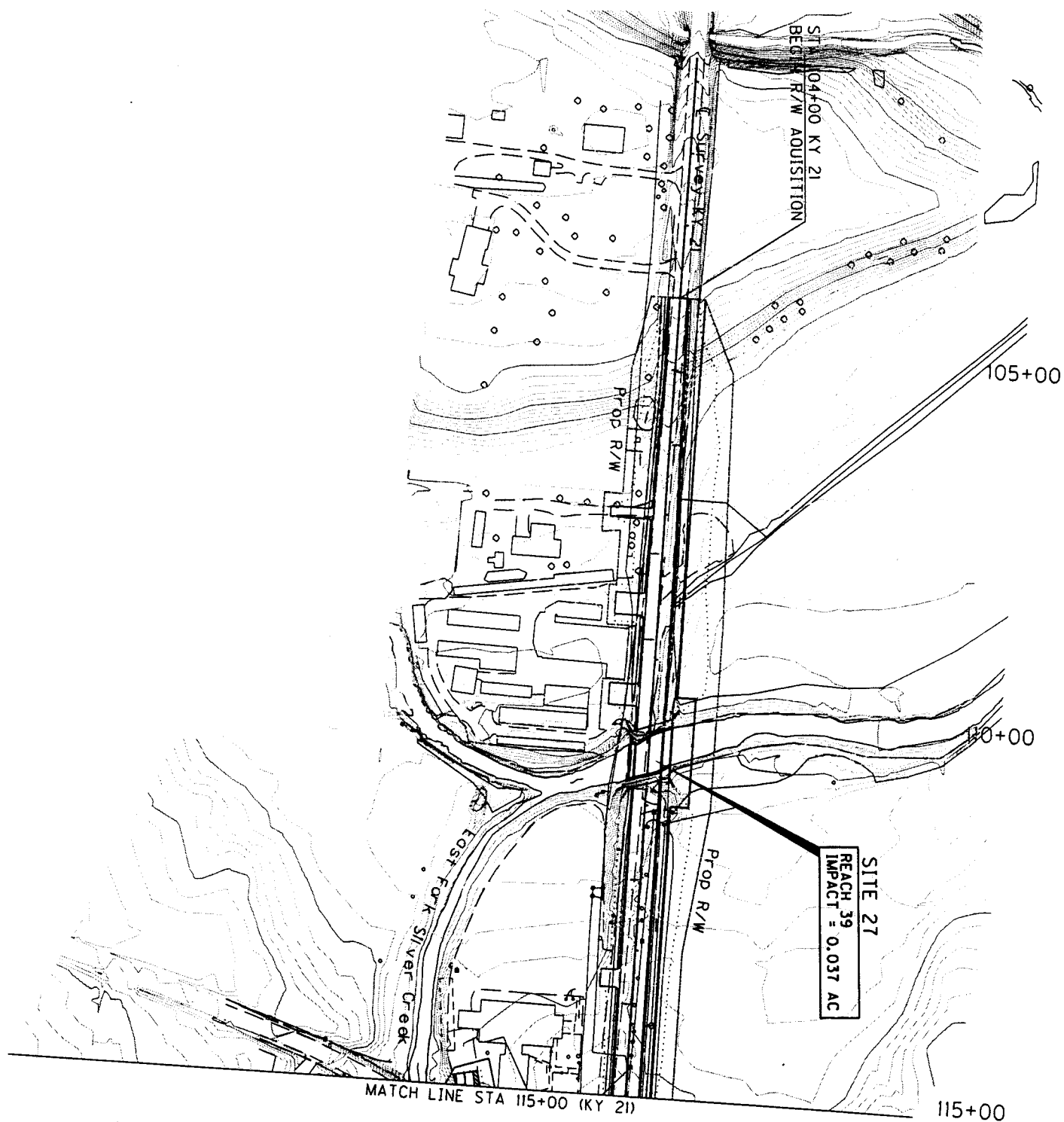
SCALE 1"=200'



LEGEND

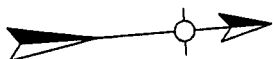
—	EXIST. STREAM
---	TEMP. ESMT
---	PROJ. R/W
---	EXIST. R/W
---	CONSTRUCTION LIMITS
---	WETLAND
---	ORAINAGE DITCH
---	TREES/SHRUBS
---	STORMWATER

SCALE 1"=200'



MATCH LINE STA 115+00 (KY 21)

115+00

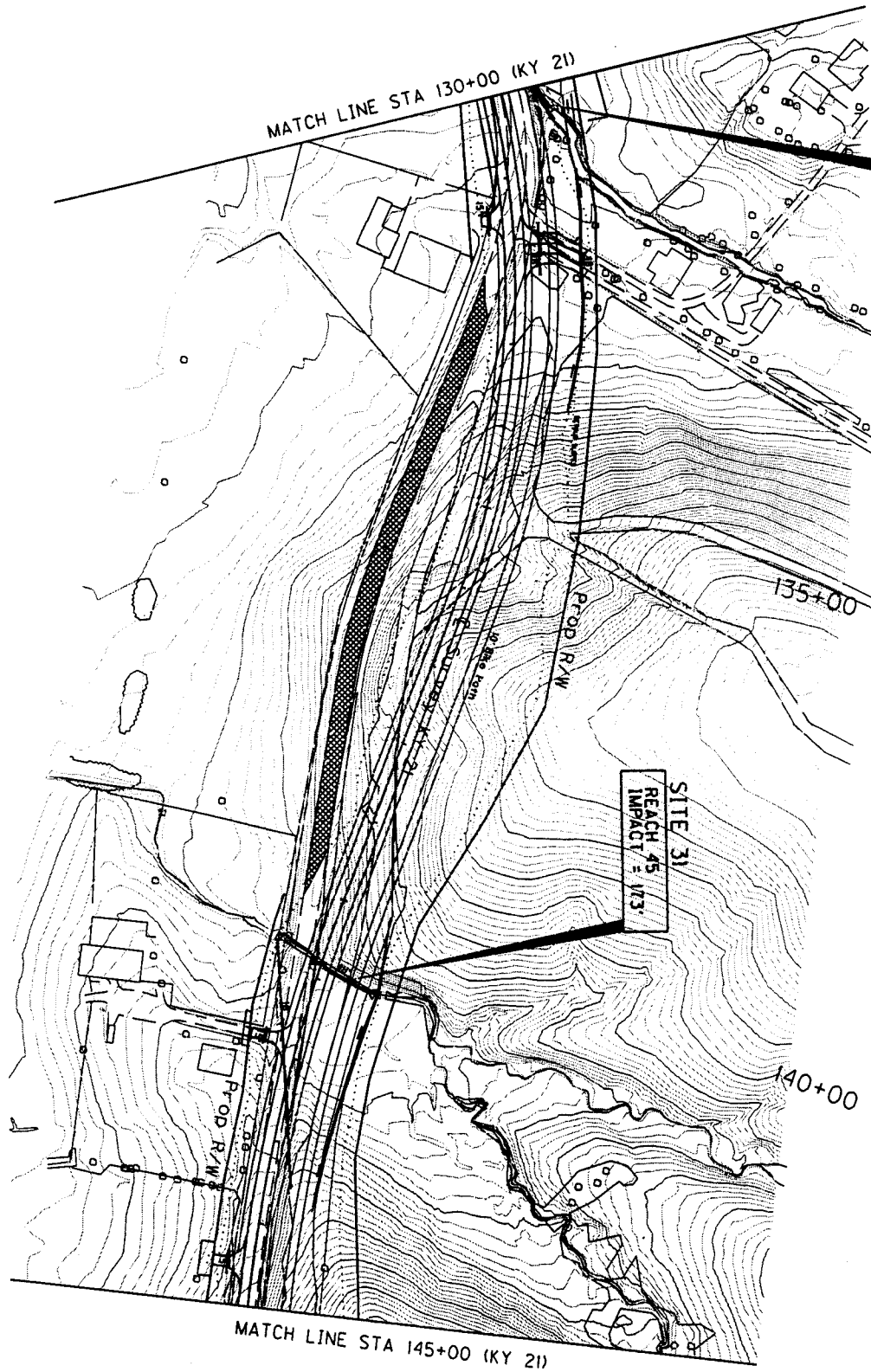


LEGEND

1. SURVEY LIMITS	—————
PROP. R/W	—————
TEMP. EMT	—————
EXIST. R/W	—————
EXIST. STREAMS	—————
STREAM IMPACT	~~~~~
TREES, SHRUBS	~~~~~
DRAINAGE DITCH	~~~~~
WETLAND	~~~~~

SCALE 1"=200'

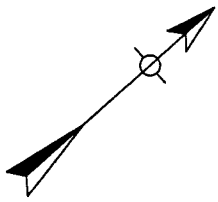
SITE 30
REACH 42 US
IMPACT = 190'



SITE 31
REACH 45
IMPACT = 173'

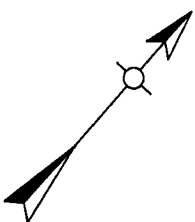
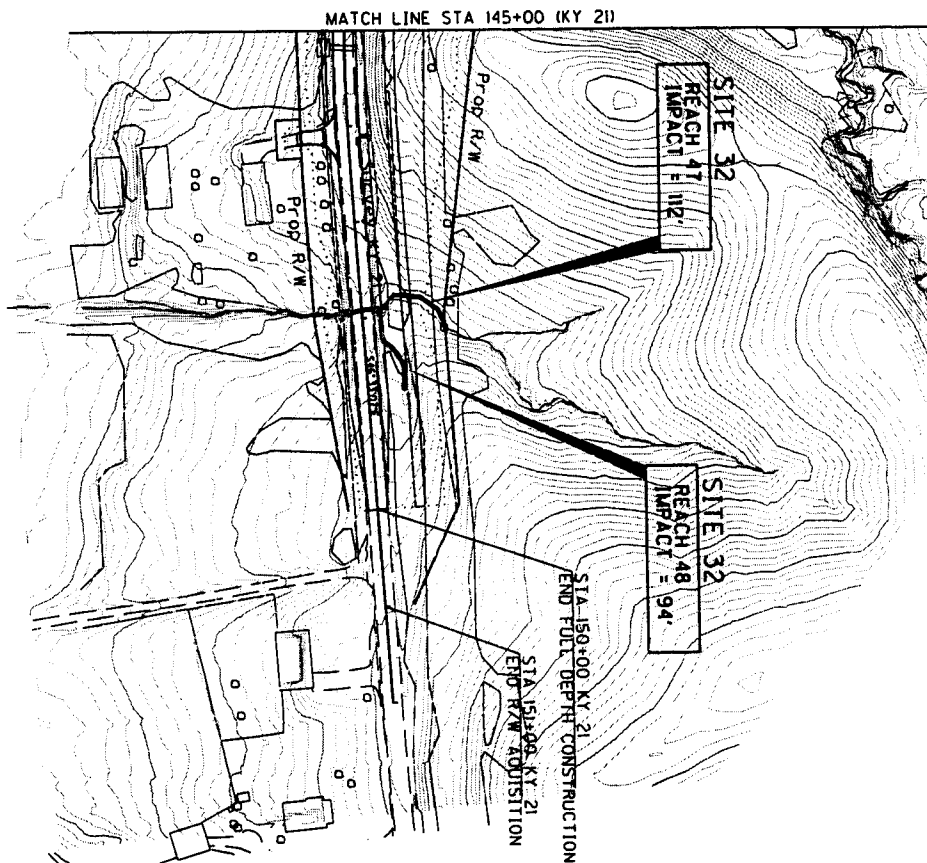
MATCH LINE STA 145+00 (KY 21)

MATCH LINE STA 130+00 (KY 21)



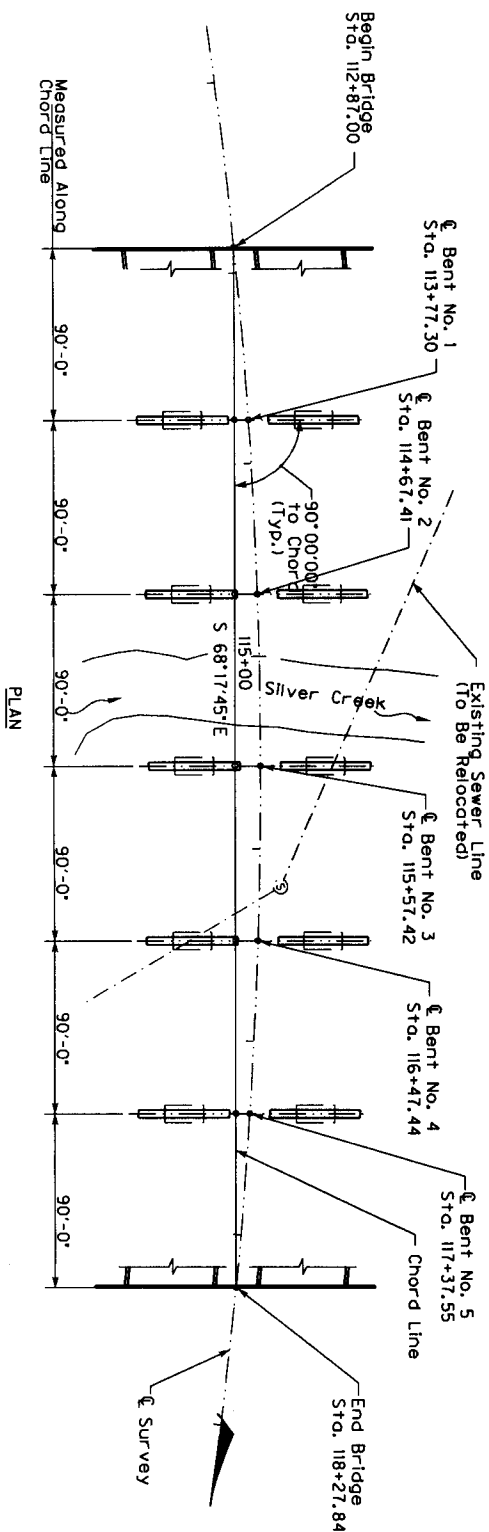
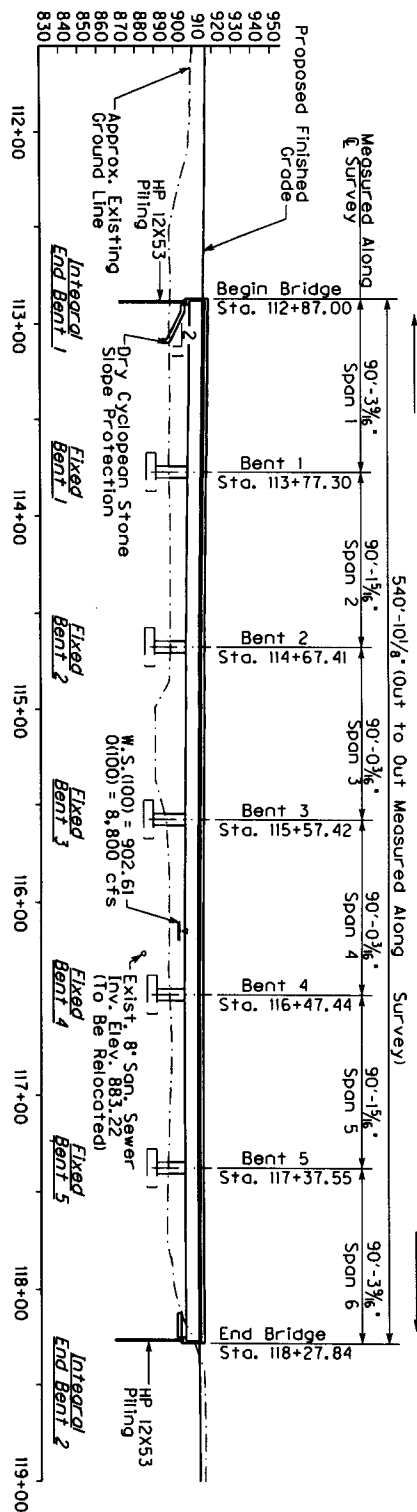
LEGEND	
—	SURVEY
—	CONSTRUCTION
—	LIMITS
—	PROP R/W
—	TEMP ESWT
—	EXIST R/W
—	EXIST STREAMS
—	STREAM
—	IMPACT
—	TREES/SHRUBS
—	DRAINAGE DITCH
—	WETLAND

SCALE 1"=200'



SCALE 1"=200'

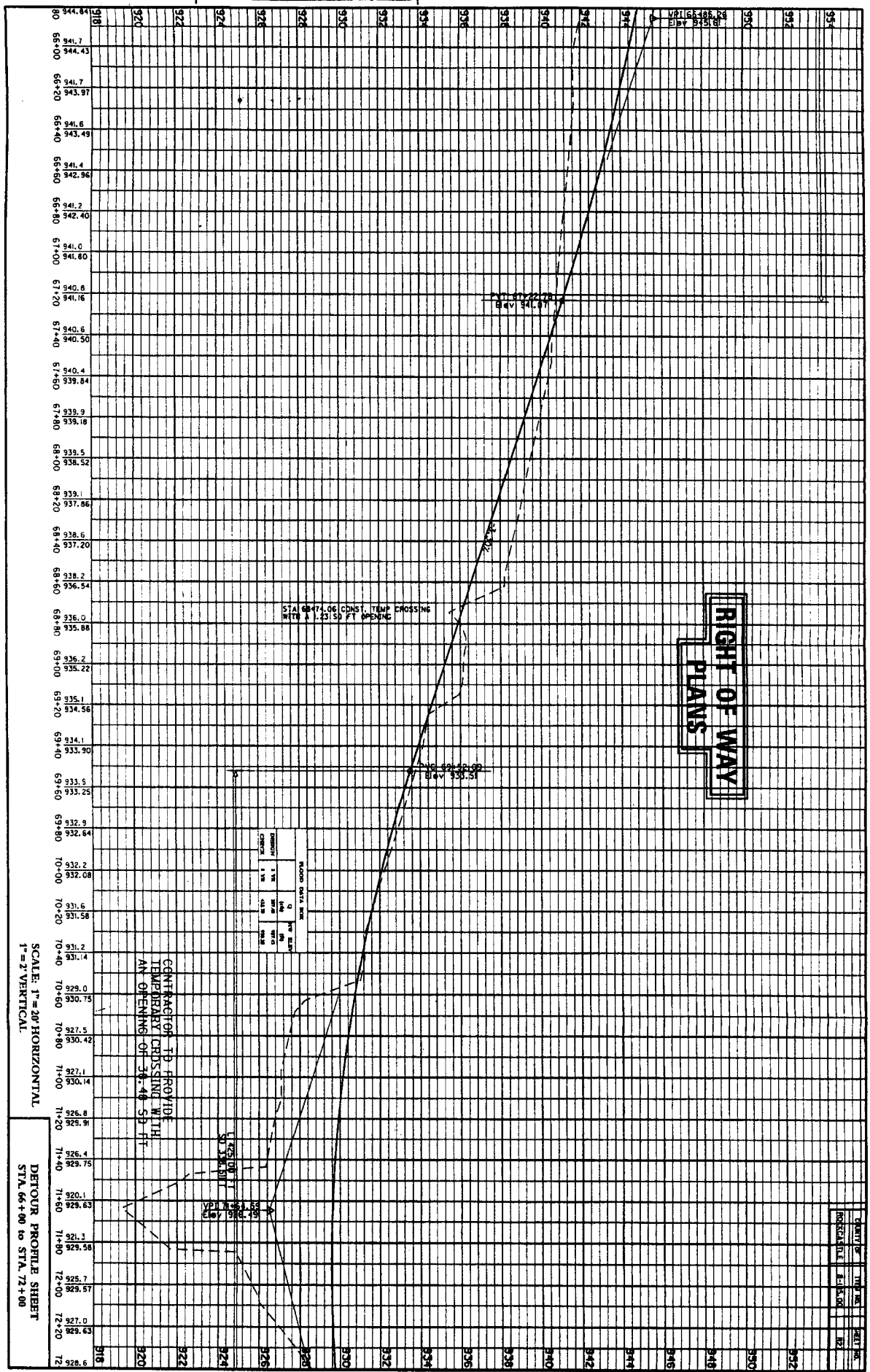
LEGEND	
—	EXISTING
—	CONSTRUCTION
—	LIMITS
—	PROP R/W
—	TEMP ESWT
—	EXIST R/W
—	EXIST
—	STREAM
—	WETLAND
—	TREES/SHRUBS
—	DRAINAGE DITCH

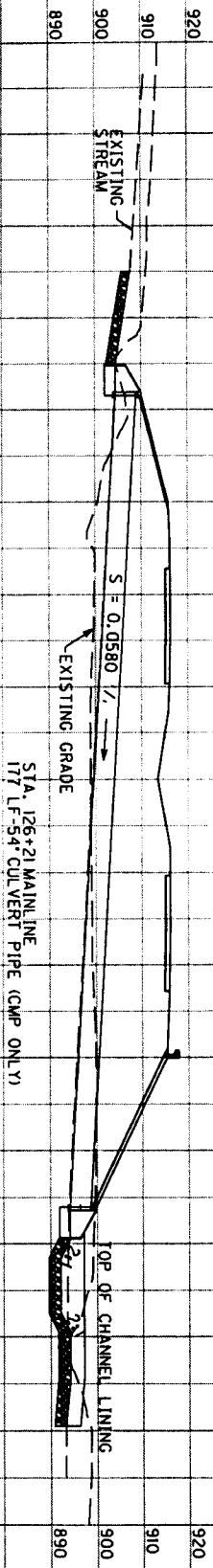
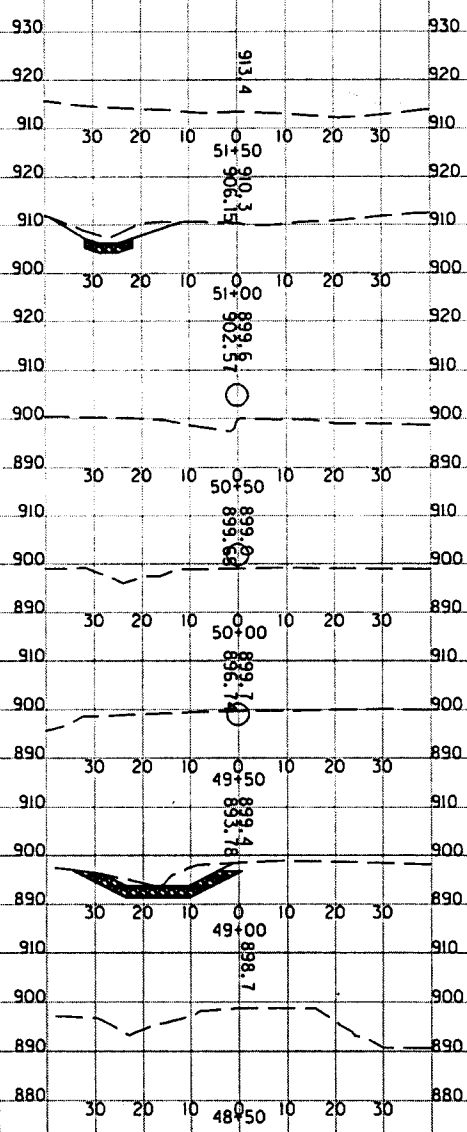
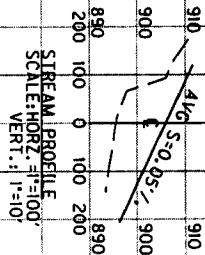


Superstructure Not Shown For Clarity

STREAM: Silver Creek, Sites 1 and 27

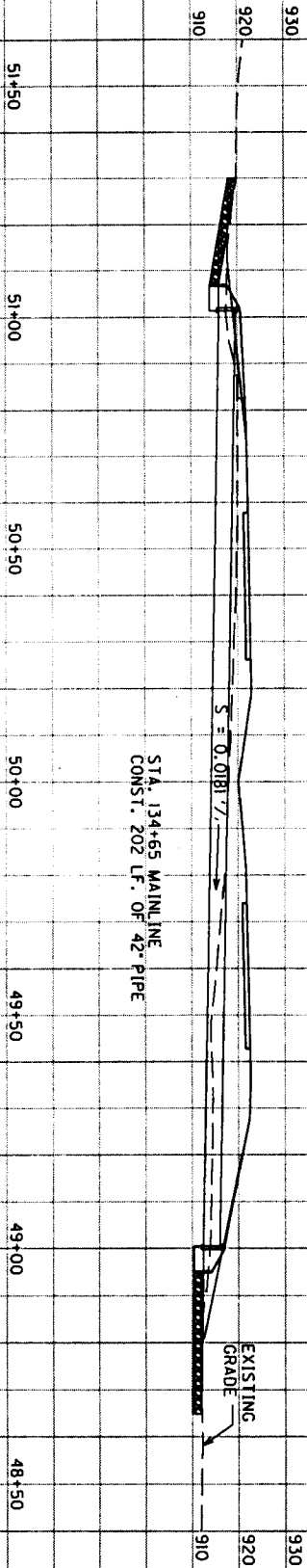
CHECKED BY _____ DATE _____
APPROVED BY _____ DATE _____



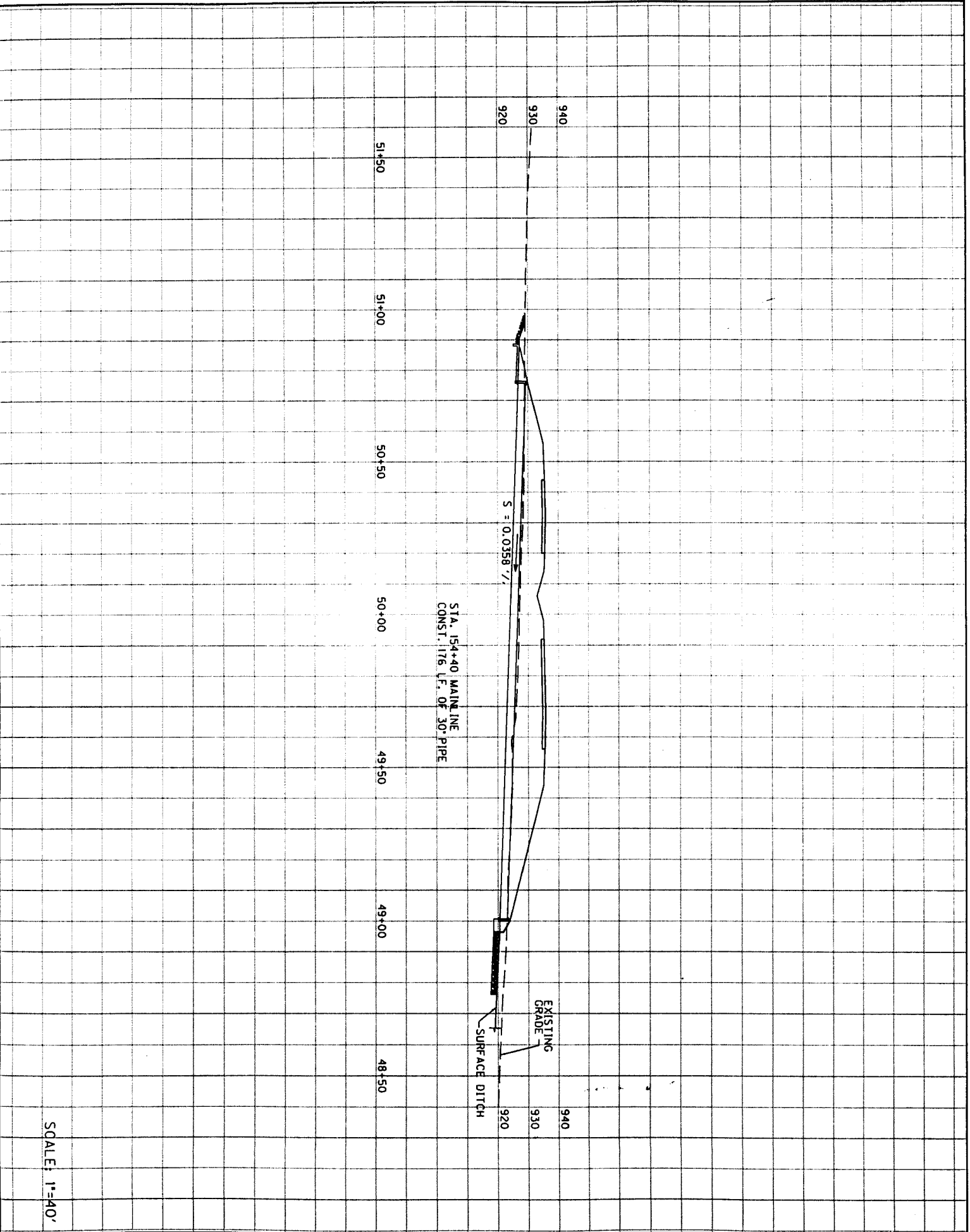


SCALE: 1"=40'

STREAM: UT of Silver Creek

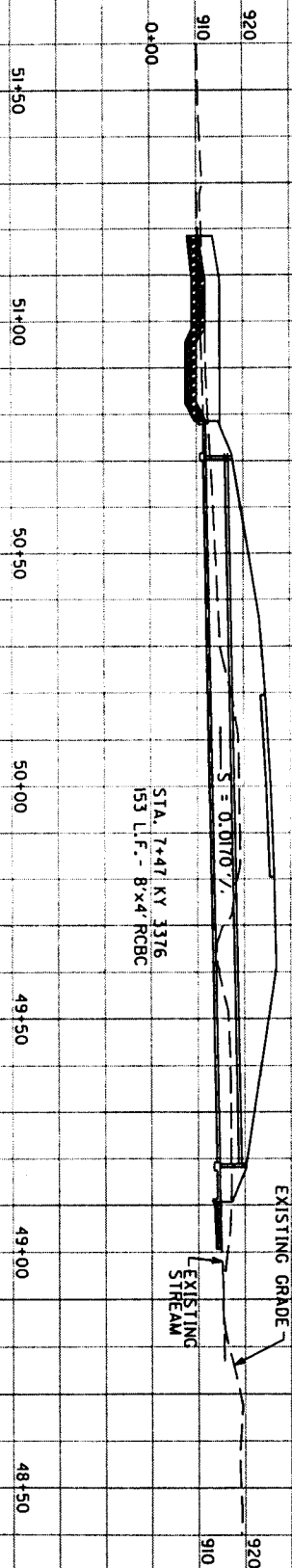
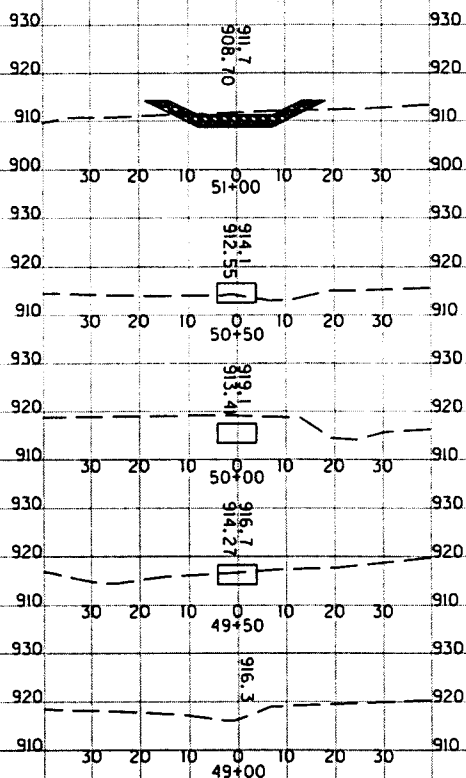
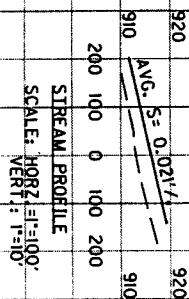


SCALE: 1"=40'



SCALE: 1"=40'

STREAM: UT to Terrell Branch

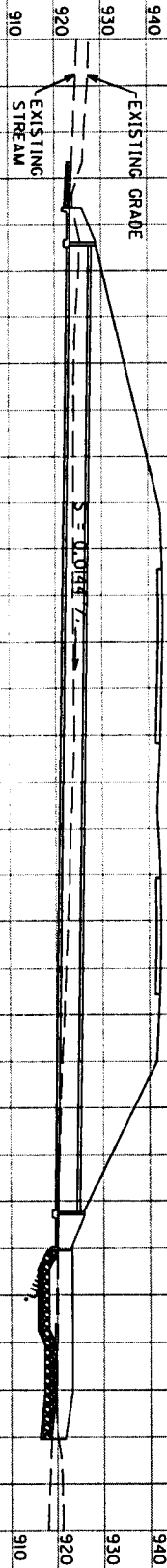
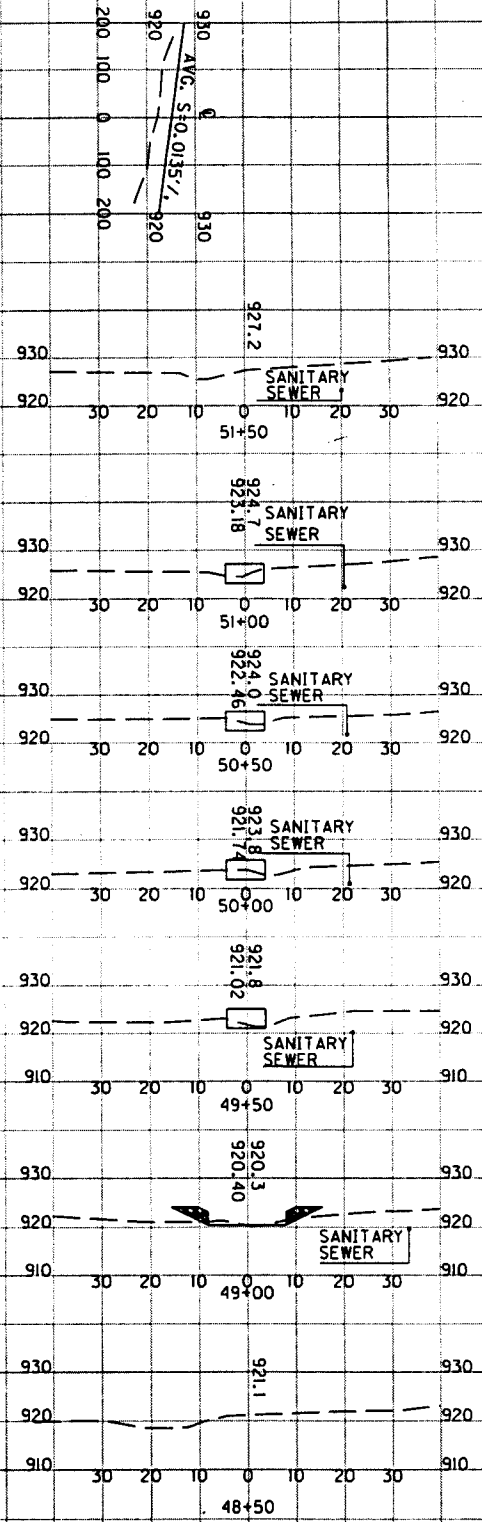


STA. 7+47 KY 3376
153 L.F. - 8"x4" RCBC

EXISTING GRADE

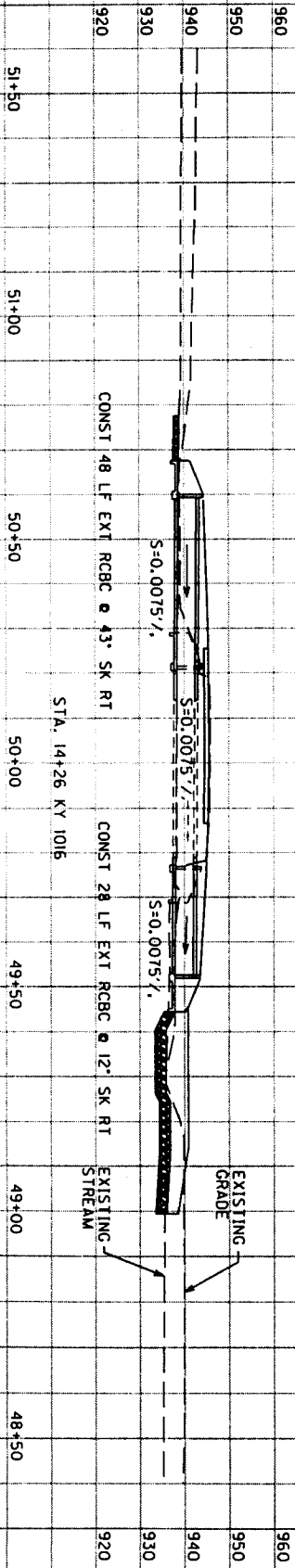
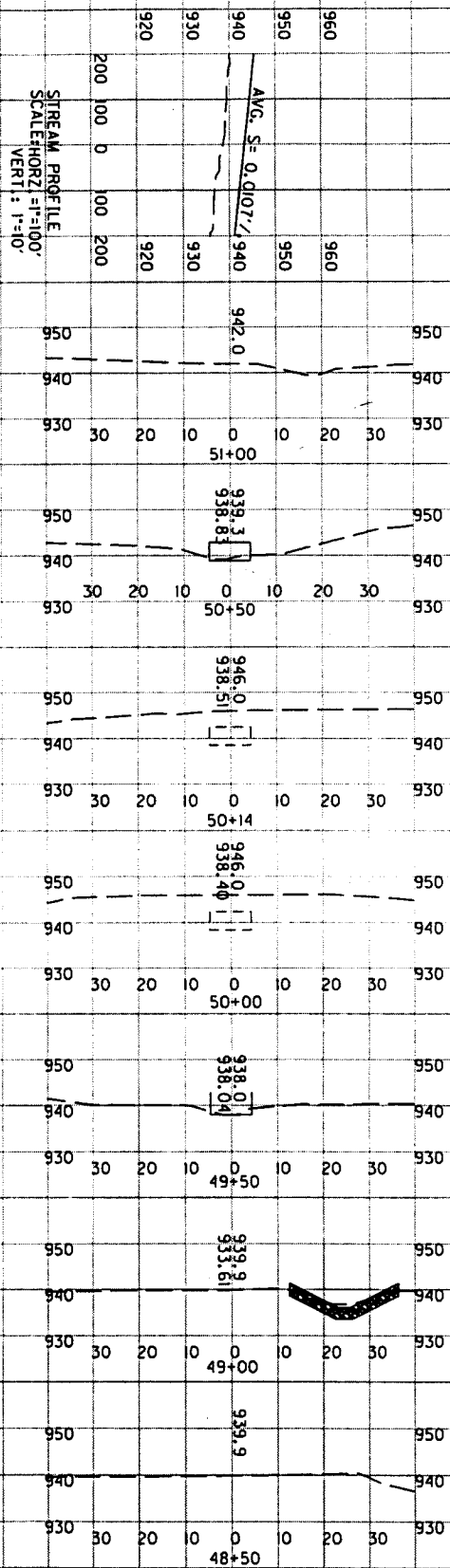
EXISTING
STREAM

SCALE: 1"=40'



STA. 157+43 MAINLINE
209 LF- 8"x4' RCBC

SCALE: 1"=40'



STREAM: UT of Terrell Branch

51+50

51+00

50+50

50+00

49+50

49+00

48+50

940
930
920
EXISTING
STREAM

EXISTING GRADE

STA. 176+36 MAINLINE
132 L.F. - 10' x 4' RCBC

940
930
920

940
930
200 100 0 100 200
AVG. S = 0.0081%

940
930
30 20 10 0 10 20 30
936.7

940
930
30 20 10 0 10 20 30
936.0

940
930
30 20 10 0 10 20 30
934.4
931.63

940
930
30 20 10 0 10 20 30
932.7
931.40

940
930
30 20 10 0 10 20 30
932.1
931.17

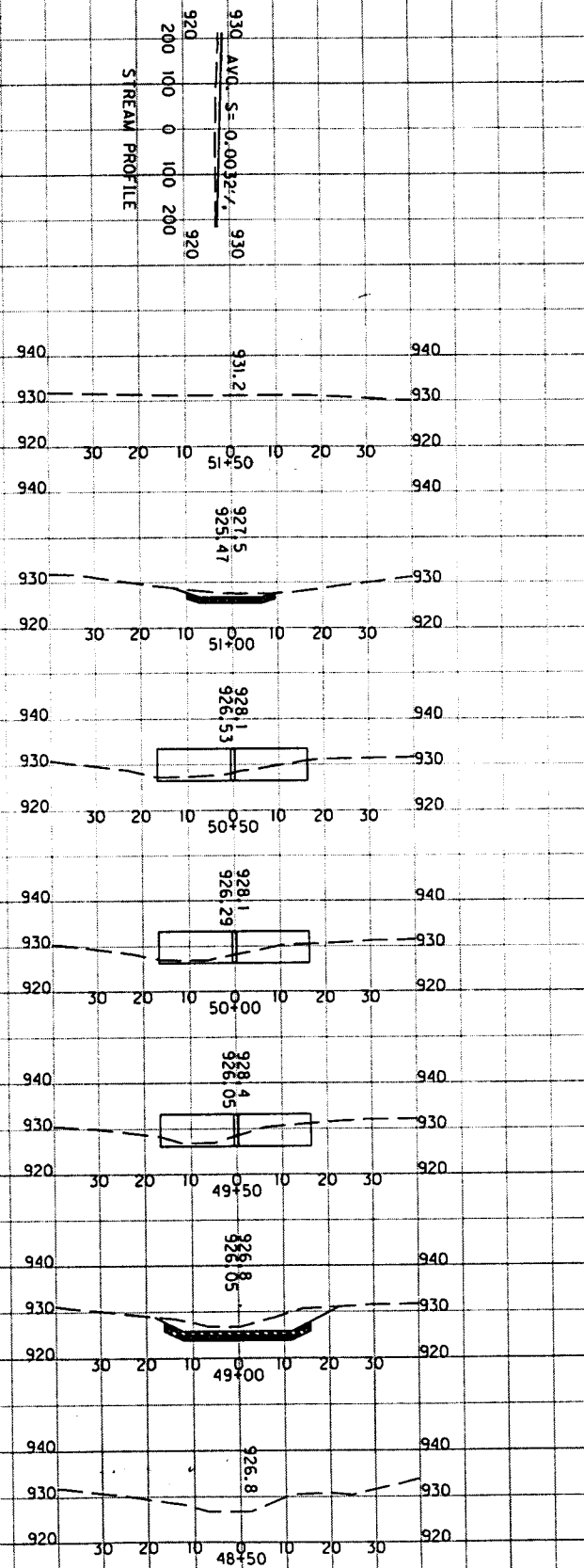
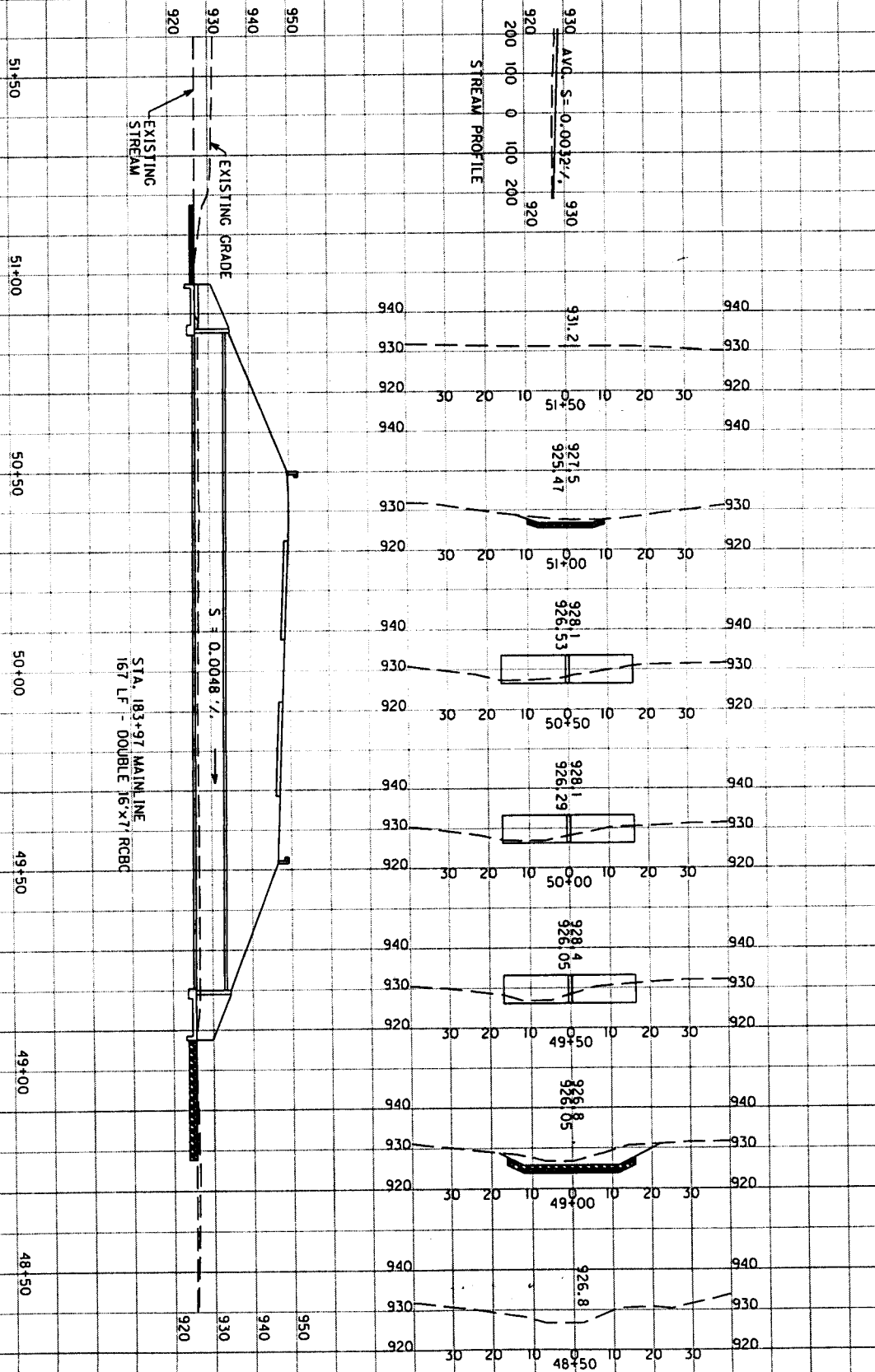
940
930
30 20 10 0 10 20 30
933.4
930.00

940
930
30 20 10 0 10 20 30
932.9
930.50

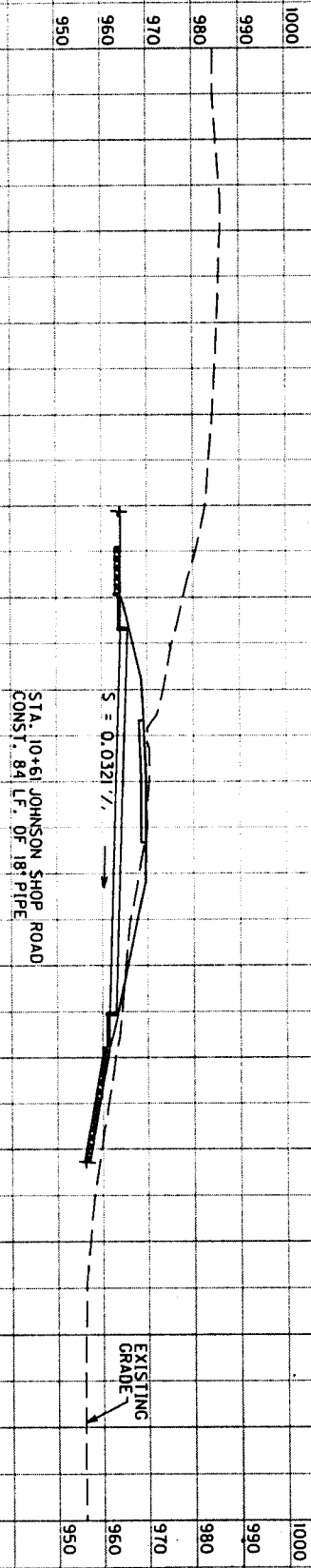
940
930
30 20 10 0 10 20 30
932.8
930.00

SCALE: 1"=40'

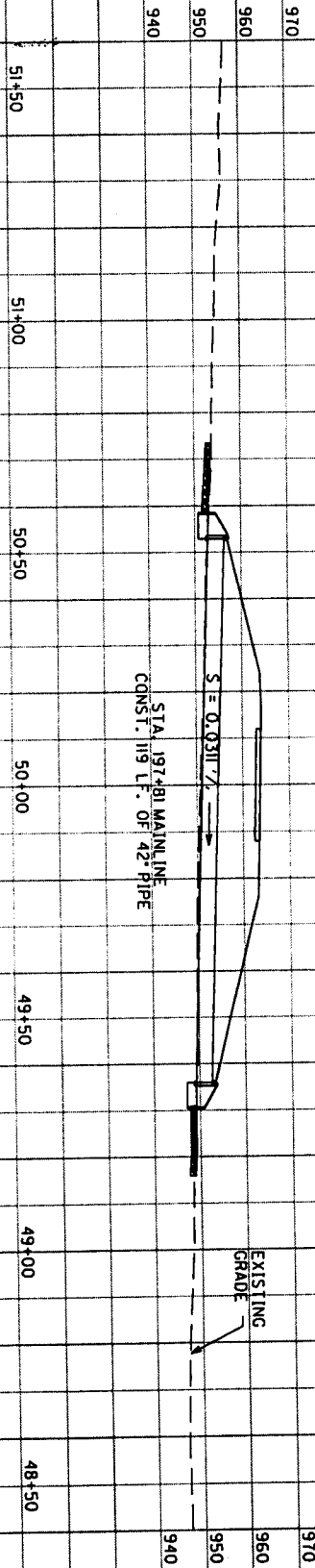
STREAM: Terrill Branch



SCALE: 1"=40'

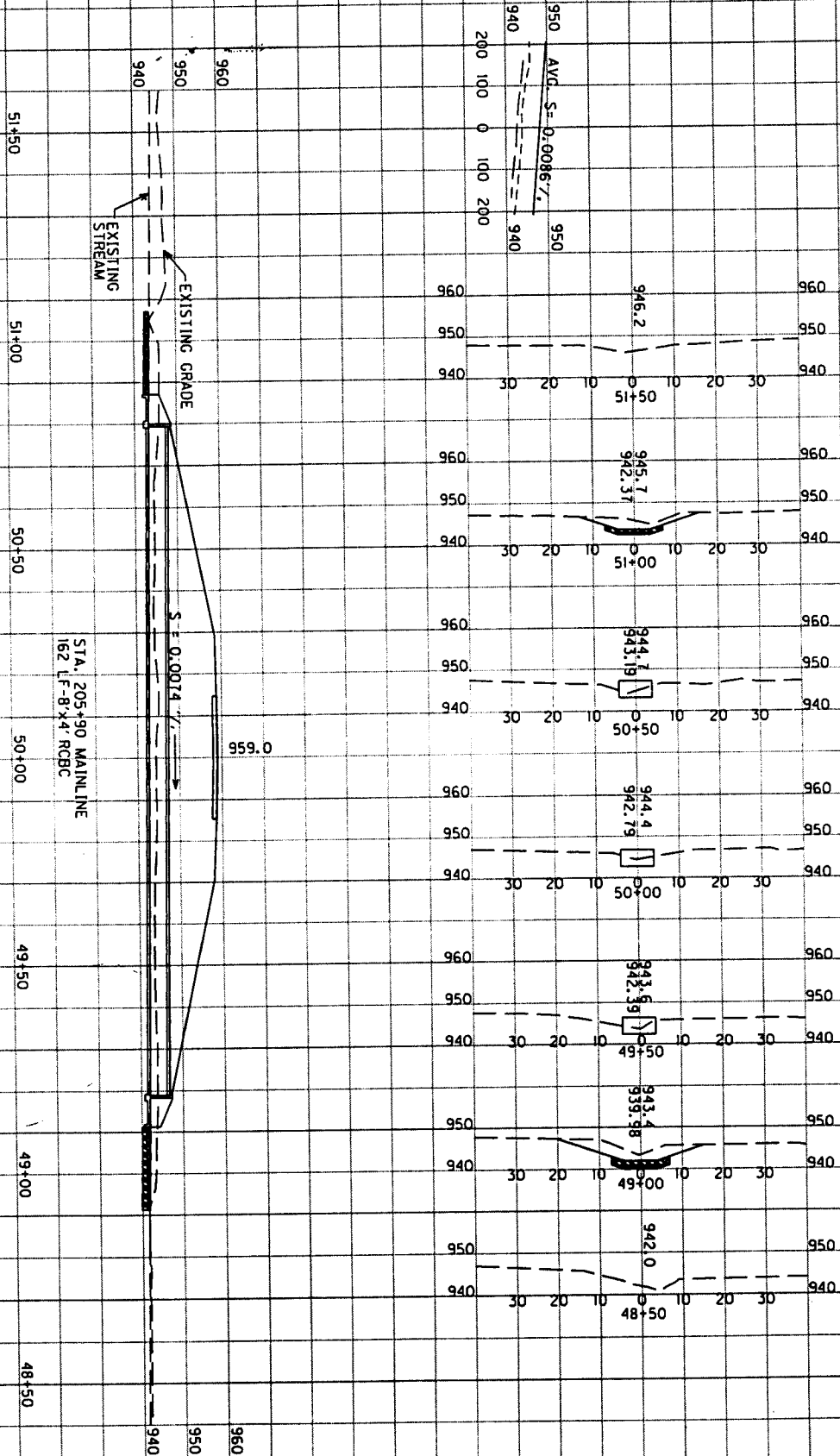


STREAM: UT of Terrill Branch



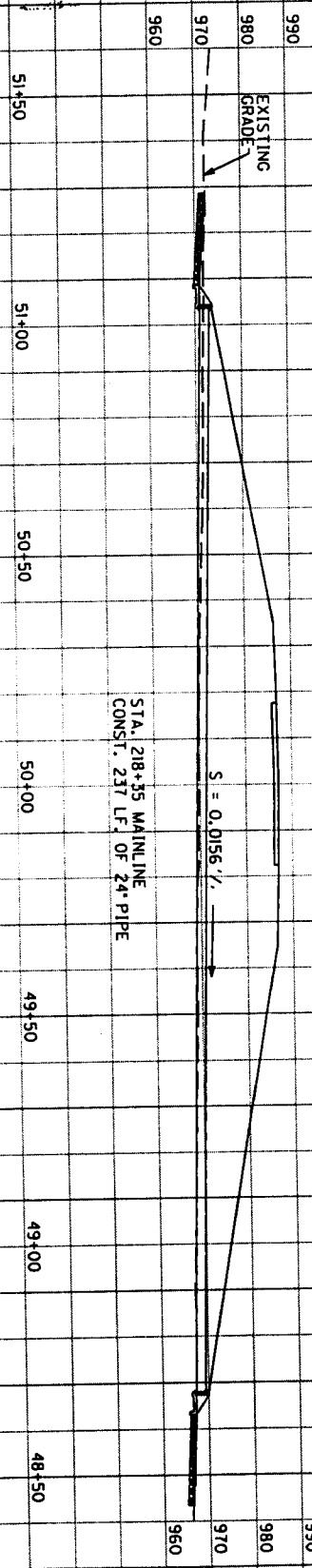
SCALE: 1"=40'

STREAM: UT of Terrell Branch



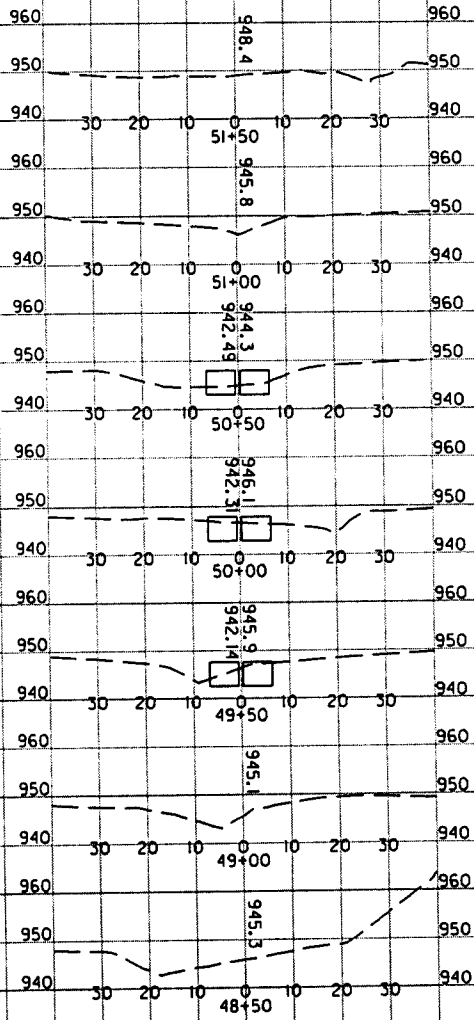
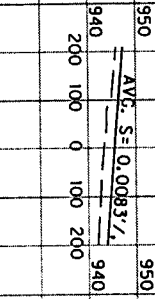
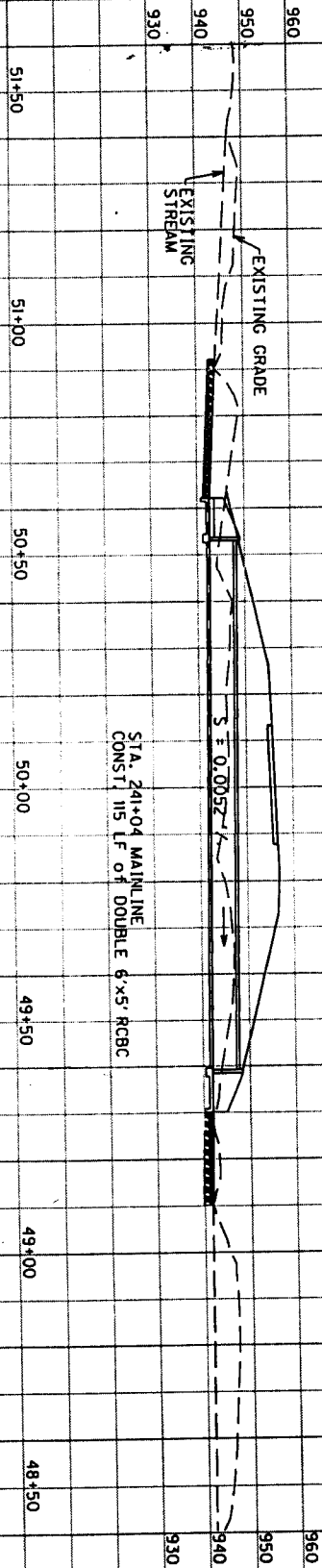
SCALE: 1"=40'

STREAM: UT of Silver Creek

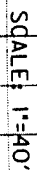


SCALE: 1"=40'

STREAM: UT of Silver Creek



SCALE: 1"=40'

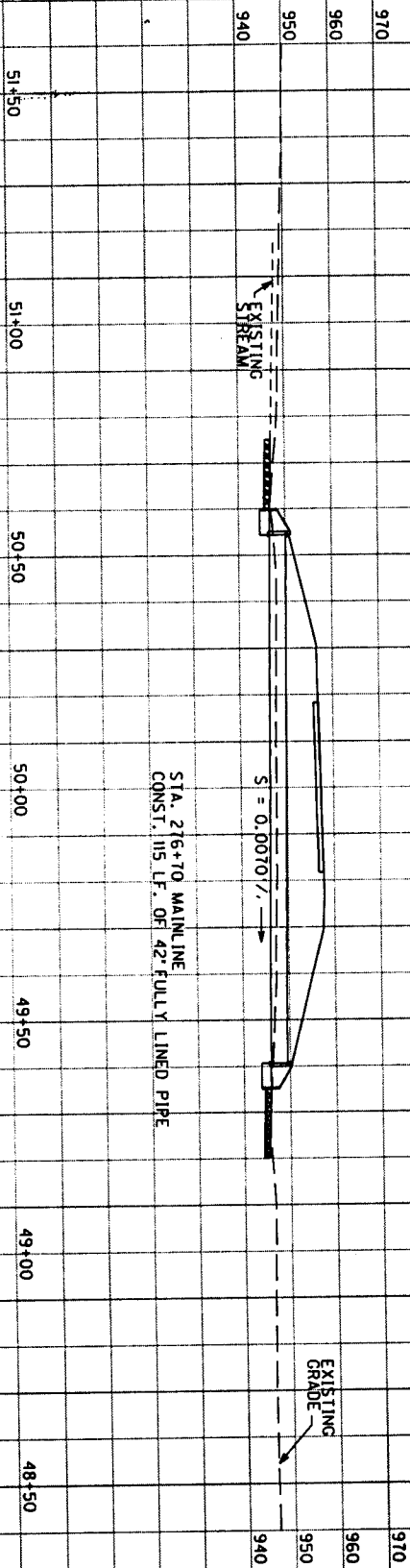




EXISTING GRADE

EXISTING STREAM

SCALE: 1"=40'



SCALE: 1"=40'



KY 21 STA. 116+88.58
CONST. 98 LF. OF 36" PIPE

SCALE: 1"=40'

Kentucky Transportation

COUNTY: MADISON
PROJECT: BEREBA BYPASS

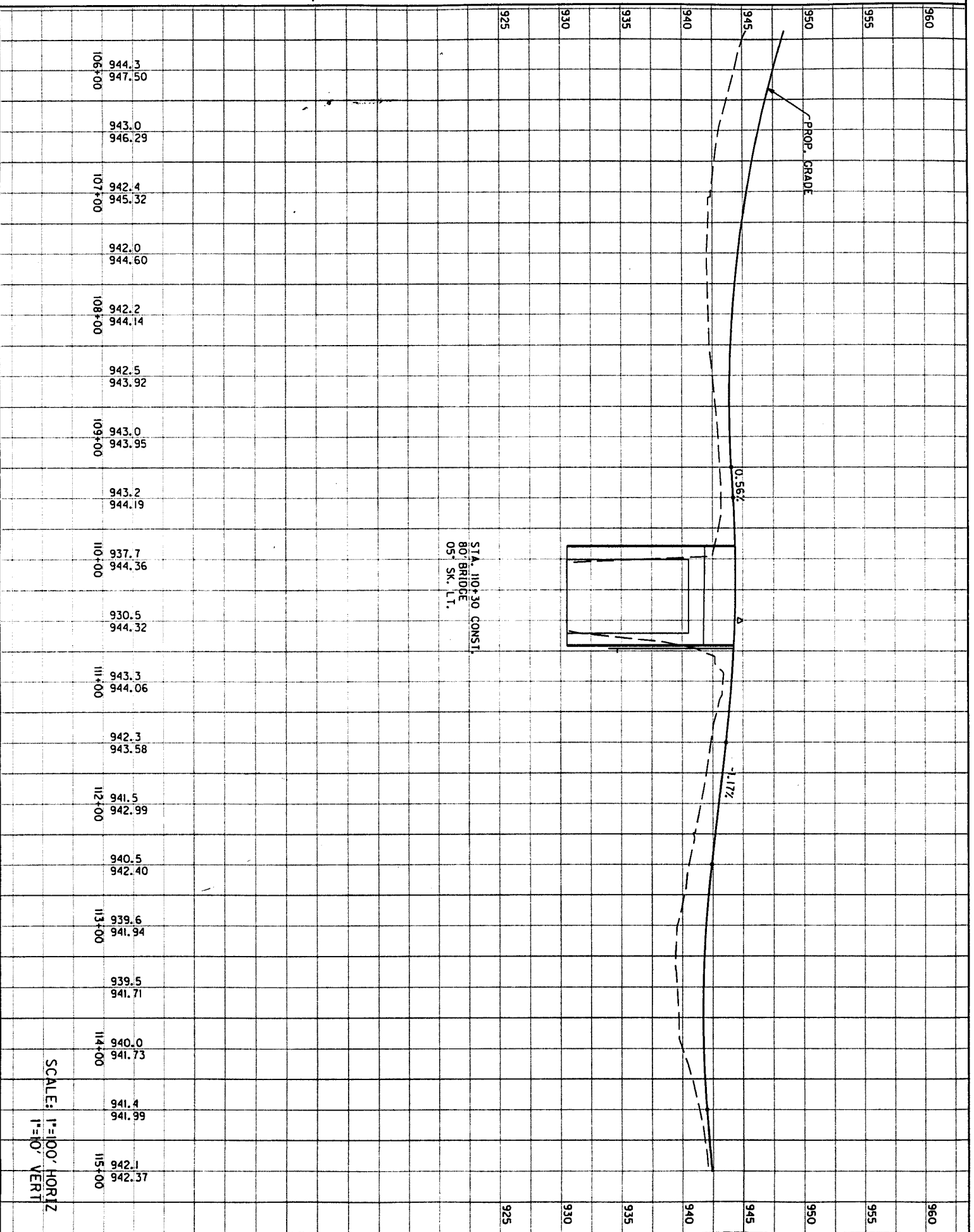
STATE: KENTUCKY

STA 110+30.00 (KY 21) - SITE 27

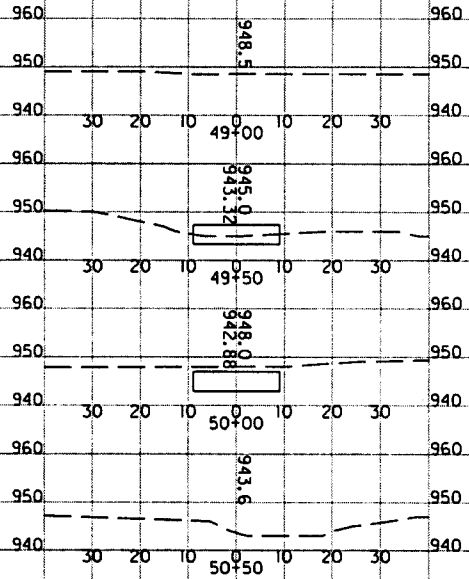
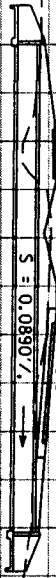
ITEM: 7-192.20

PIPE SHEET 36

STREAM: Silver Creek



KY 21 STA 129+75
CONST. 101 LF. OF 18" x 4' RCBC



SCALE: 1"=40'

Kentucky
Transportation

COUNTY: MADISON

STATE: KENTUCKY

STA 140+80.00 (KY 21) - SITE 31

ITEM: 7-192.20

PIPE SHEET 38

PROJECT: BEREA BYPASS

STREAM: UT of East Fork Silver Creek

990
980
970
960
950
940

EXISTING
GRADE

$S = 0.0325\%$
KY 21 STA. 140+80
CONST. 123 L.F. OF 48" PIPE

990
980
970
960
950
940

SCALE: 1"=40'

MITIGATION DISCUSSION

Item No. 7-192.20

For intermittent and perennial stream impacts, the need for mitigation was based on whether an impact site was greater than 0.10 acres in area, or greater than 500' in length. For ephemeral streams, mitigation needs were based on impacts greater than 0.10 acres, but no length was utilized. Based on the criteria, there were no sites that required mitigation.

The wetland mitigation needs were determined for impacts greater than 0.10 acres. Of the ten wetlands identified, only one (Wetland E) should require mitigation. The other wetland impacts were either individually less than 0.10 acre, or where they were hydrologically connected with impacted streams, the total site impact was still less than 0.10 acres. Mitigation for the wetland will be accomplished at one of the state owned wetland mitigation bank sites. Mitigation for 0.2 acres of wetland loss will be the debiting of 0.4 acres of credit from the Lincoln Co Wetland Mitigation Site, which is currently under permit review for the addition of 30+ acres of additional wetland restoration credits. If credits from Lincoln County are not available prior to permitting, KYTC would propose the payment of the current wetland in-lieu fee.

It should be noted that the Division of Water will require mitigation for impacts resulting from this project. Based on their criteria for impacts greater than 200' on "blue-line" streams within watersheds of 250 acres or greater; the culverts at Sta. 183+97, Sta. 253+14, and KY21-Sta. 129+75 will require mitigation.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Berea Bypass Item No. 7-192.20																	
2	Before Impact										After Impact							
3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4	Station			Type of	Accege of	Watershed	Initial RPB		Impact				Predicted	Predicted	Final	Final		
5	Site #	Number	Stream Type	Impact	Impact	size in acres	Score	Initial Quality	Length	Ratio	Debit	Required?	RPB score	Quality	Length	Ratio	Credits	Balance
6																		
7		Reach																
8	10	16		culvert	0.029	897	134	poor	256	1.5	384	y	0		0	0	0	-384
9																		
10	21	29		culvert	0.05	289	82	poor	437	1.5	656	y	0		0	0	0	-656
11																		
12	30	42US		culvert	0.022	489	132	poor	190	1.5	285	y	0		0	0	0	-285
13		42DS		culvert	0.013	489	77	poor	114	1.5	171	y	0		0	0	0	-171
14																		
15																		
16																		
17																Total		-1496

High Gradient Stream Data Sheet

STREAM NAME: <i>-Reach 16 (Terrell Br.)</i>			LOCATION: <i>-Sta. 183+97 (Mainline)</i>		
STATION: <i>N37-35-38</i>	DRAINAGE AREA (AC): <i>W84-15-25</i>	-	BASIN/WATERSHED: <i>-Silver Creek (Kentucky River)</i>		
LAT: <i>-8/28/06</i>		LONG: <i>-Madison</i>	COUNTY: <i>USGS 7.5 TOPO: -Berea</i>		
DATE: <i>-8/28/06</i>		TIME: <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	INVESTIGATORS: <i>-Rob Lewis, Jason Britton</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: <input type="checkbox"/> Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Heavy rain <input type="checkbox"/> Steady rain <input type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny Has there been a heavy rain in the last 7 days? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Air temperature <i>80</i> °F. Inches rainfall in past 24 hours <i>0</i> in % Cloud Cover _____					
P-Chem: Temp (°F) <i>79</i> D.O. (mg/l) _____ % Saturation _____ pH(S.U.) _____ Cond. <i>335</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width <i>5.0</i> ft Range of Depth <i>0 - 1.0</i> ft Average Velocity _____ ft/s Discharge _____ cfs Est. Reach Length _____		LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input checked="" type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers			
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts		Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential		Stream Type: <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep	
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous Number of Strata <i>1</i>		Dom. Tree/Shrub Taxa <i>Maple</i> <i>Ironweed</i> <i>Joe Pie weed</i>		Canopy Cover; <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations; <input type="checkbox"/> Dredging <input checked="" type="checkbox"/> Channelization (<input checked="" type="checkbox"/> Full <input type="checkbox"/> Partial)					
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.		Riffle <i>25</i> %		Run; _____ %	
Pool <i>75</i> %					
Silt/Clay (<0.06 mm)					
Sand (0.06-2 mm)					
Gravel (2-64 mm)		<i>60</i>		<i>60</i>	
Cobble (64-256 mm)		<i>30</i>		<i>30</i>	
Boulders (>256 mm)					
Bedrock		<i>10</i>		<i>10</i>	
Habitat	Condition Category				
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

134

NOTES/COMMENTS;

High Gradient Stream Data Sheet

STREAM NAME: <i>-Reach 29</i>			LOCATION: <i>-Sta. 253+14 (Mainline)</i>		
STATION: <i>N37-34-23</i>		DRAINAGE AREA (AC) <i>W84-15-18</i>	BASIN/WATERSHED: <i>-Silver Creek (Kentucky River)</i>		
LAT: <i>-8/30/06</i>		LONG: <i>-Madison</i>	COUNTY; <i>USGS 7.5 TOPO; -Berea</i>		
DATE: <i>-8/30/06</i>		TIME: <i>□AM</i> <input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>-Rob Lewis, Julie Clark</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: <div style="display: flex; justify-content: space-between;"> <div> Now <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> </div> <div> Past 24 hours <input type="checkbox"/> <input type="checkbox"/> Heavy rain <input type="checkbox"/> <input type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny </div> <div> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air temperature <i>78</i> °F. Inches rainfall in past 24 hours <i> </i> in <i>90</i> % Cloud Cover </div> </div>					
P-Chem: Temp (°F) <i>73</i> D.O. (mg/l) <i> </i> % Saturation <i> </i> pH(S.U.) <i> </i> Cond. <i>188</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width <i>5.0</i> ft Range of Depth <i>.1 - 1.5</i> ft Average Velocity <i> </i> ft/s Discharge <i> </i> cfs Est. Reach Length <i> </i>		LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> <input type="checkbox"/> Surface Mining <input type="checkbox"/> Deep Mining <input type="checkbox"/> Oil Wells <input type="checkbox"/> Land Disposal </div> <div style="width: 33%;"> <input type="checkbox"/> Construction <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Row Crops </div> <div style="width: 33%;"> <input type="checkbox"/> Forest <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Silviculture <input type="checkbox"/> Urban Runoff/Storm Sewers </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div> Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input type="checkbox"/> Culverts </div> <div> Stream Flow; <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input checked="" type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential </div> <div> Stream Type; <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep </div> </div>					
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <i>Sycamore</i> <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous <i>Black willow</i> Number of Strata <i>Maple</i>		Dom. Tree/Shrub Taxa <i>Sycamore</i> <i>Black willow</i> <i>Maple</i>		Canopy Cover; <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input checked="" type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.		Riffle <i>10</i> %		Run; <i> </i> %	
Silt/Clay (<0.06 mm)		<i>50</i>		<i>70</i>	
Sand (0.06-2 mm)		<i> </i>		<i> </i>	
Gravel (2-64 mm)		<i>50</i>		<i>30</i>	
Cobble (64-256 mm)		<i> </i>		<i> </i>	
Boulders (>256 mm)		<i> </i>		<i> </i>	
Bedrock		<i> </i>		<i> </i>	
Habitat		Condition Category			
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score lower)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

82

NOTES/COMMENTS;

High Gradient Stream Data Sheet

STREAM NAME: <i>-Reach 42US</i>			LOCATION: <i>-Sta. 129+75 (KY-21)</i>		
STATION: <i>N37-33-47</i>		DRAINAGE AREA (AC): <i>W84-15-08</i>	BASIN/WATERSHED: <i>-Silver Creek (Kentucky River)</i>		
LAT: <i>-8/31/06</i>		LONG: <i>-Madison</i>	COUNTY: <i>USGS 7.5 TOPO; -Berea</i>		
DATE: <i>-8/31/06</i>		TIME: <i>: <input type="checkbox"/>AM <input checked="" type="checkbox"/>PM</i>	INVESTIGATORS: <i>-Rob Lewis, Julie Clark</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: Now <input type="checkbox"/> Past 24 hours <input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Steady rain Air temperature <u>74</u> °F. Inches rainfall in past 24 hours <u> </u> in <input type="checkbox"/> Intermittent showers <u>90</u> % Cloud Cover <input checked="" type="checkbox"/> Clear/sunny <input type="checkbox"/>					
P-Chem: Temp (°F) <u>74</u> D.O. (mg/l) <u> </u> % Saturation <u> </u> pH(S.U.) <u> </u> Cond. <u>197</u> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width <u>5.0</u> ft Range of Depth <u>.1 - 0.5</u> ft Average Velocity <u> </u> ft/s Discharge <u> </u> cfs Est. Reach Length <u> </u>		LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture <input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input checked="" type="checkbox"/> Urban Runoff/Storm Sewers			
Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input checked="" type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Other <input checked="" type="checkbox"/> Culverts		Stream Flow: <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep			
Riparian Vegetation: Dominate Type: <input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <i>Sycamore</i> <input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous <i>Grape</i> Number of Strata <u>1</u> <i>Black willow</i>		Canopy Cover; <input type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input checked="" type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)		Channel Alterations: <input type="checkbox"/> Dredging <input checked="" type="checkbox"/> Channelization <input type="checkbox"/> Full <input checked="" type="checkbox"/> Partial	
Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C		Riffle <u>70</u> %	Run; <u> </u> %	Pool <u>30</u> %	
Silt/Clay (<0.06 mm)		<u>10</u>		<u>30</u>	
Sand (0.06-2 mm)					
Gravel (2-64 mm)		<u>50</u>		<u>40</u>	
Cobble (64-256 mm)		<u>40</u>		<u>30</u>	
Boulders (>256 mm)					
Bedrock					
Habitat Condition Category					
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7 Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score

132

NOTES/COMMENTS;

High Gradient Stream Data Sheet

STREAM NAME: <i>-Reach 42DS</i>			LOCATION: <i>-Sta. 129+75 (KY-21)</i>		
STATION: <i>N37-33-47</i>		DRAINAGE AREA (AC): <i>W84-15-08</i>	BASIN/WATERSHED: <i>-Silver Creek (Kentucky River)</i>		
LAT: <i>N37-33-47</i>		LONG: <i>W84-15-08</i>	COUNTY: <i>-Madison</i> USGS 7.5 TOPO: <i>-Berea</i>		
DATE: <i>-8/31/06</i>		TIME: <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM	INVESTIGATORS: <i>-Rob Lewis, Julie Clark</i>		
TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.					
WEATHER: <div style="display: flex; justify-content: space-between;"> <div> Now <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> </div> <div> Past 24 hours <input type="checkbox"/> Heavy rain <input type="checkbox"/> Steady rain <input checked="" type="checkbox"/> Intermittent showers <input type="checkbox"/> Clear/sunny </div> <div> Has there been a heavy rain in the last 7 days? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Air temperature <i>74</i> °F. Inches rainfall in past 24 hours <i> </i> in <i>80</i> % Cloud Cover </div> </div>					
P-Chem: Temp (°F) <i>75</i> D.O. (mg/l) <i> </i> % Saturation <i> </i> pH(S.U.) <i> </i> Cond. <i>204</i> <input type="checkbox"/> Grab					
INSTREAM WATERSHED FEATURES Stream Width <i>5.0</i> ft Range of Depth <i>.1-0.5</i> ft Average Velocity <i> </i> ft/s Discharge <i> </i> cfs Est. Reach Length <i> </i>		LOCAL WATERSHED FEATURES: Predominant Surrounding Land Use: <div style="display: flex; flex-wrap: wrap;"> <div style="width: 33%;"> <input type="checkbox"/> Surface Mining <input type="checkbox"/> Deep Mining <input type="checkbox"/> Oil Wells <input type="checkbox"/> Land Disposal </div> <div style="width: 33%;"> <input type="checkbox"/> Construction <input type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Row Crops </div> <div style="width: 33%;"> <input type="checkbox"/> Forest <input checked="" type="checkbox"/> Pasture/Grazing <input type="checkbox"/> Silviculture <input type="checkbox"/> Urban Runoff/Storm Sewers </div> </div>			
<div style="display: flex; justify-content: space-between;"> <div> Hydraulic Structures: <input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> Other <input checked="" type="checkbox"/> Culverts </div> <div> Stream Flow: <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input checked="" type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential </div> <div> Stream Type: <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep </div> </div>					
Riparian Vegetation: Dominate Type: <input type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous Number of Strata <i>1</i>		Dom. Tree/Shrub Taxa <i>Fescue (mowed to edge of channel)</i>		Canopy Cover: <input checked="" type="checkbox"/> Fully Exposed (0-25%) <input type="checkbox"/> Partially Exposed (25-50%) <input type="checkbox"/> Partially Shaded (50-75%) <input type="checkbox"/> Fully Shaded (75-100%)	
Channel Alterations: <input type="checkbox"/> Dredging <input checked="" type="checkbox"/> Channelization <input checked="" type="checkbox"/> Full <input type="checkbox"/> Partial					
Substrate <input type="checkbox"/> Est. <input type="checkbox"/> P.C.		Riffle <i>30</i> %	Run; <i> </i> %	Pool <i>70</i> %	
Silt/Clay (<0.06 mm)		<i>30</i>		<i>30</i>	
Sand (0.06-2 mm)					
Gravel (2-64 mm)		<i>40</i>		<i>40</i>	
Cobble (64-256 mm)		<i>30</i>		<i>30</i>	
Boulders (>256 mm)					
Bedrock					
Condition Category					
Habitat					
Parameter	Optimal	Suboptimal	Marginal	Poor	
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient.	40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)	Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)	Dominated by 1 velocity/depth regime.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Frequency of Riffles	Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.	Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.	Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone).	Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

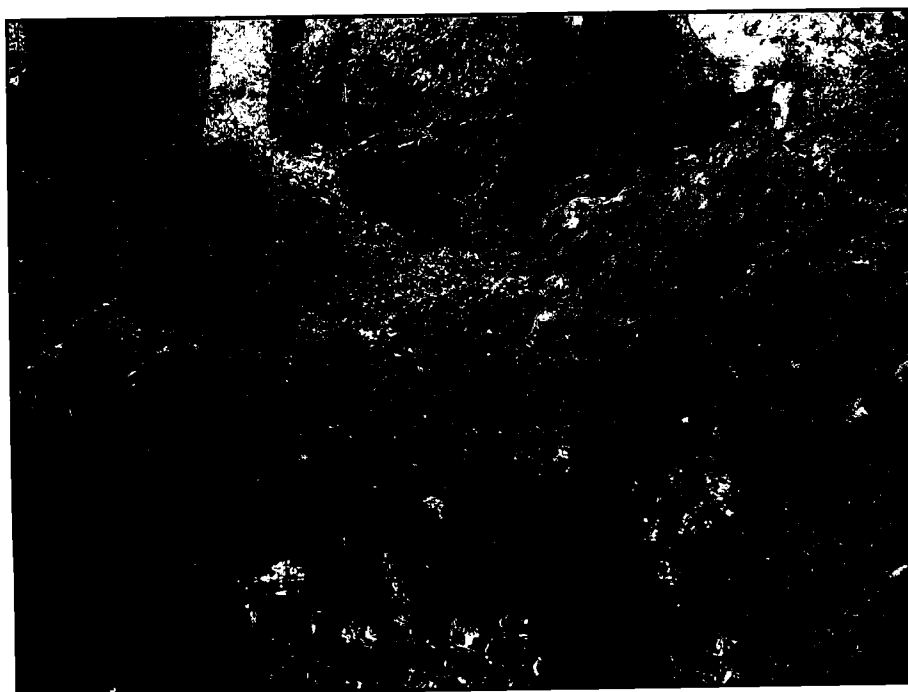
Total Score

77

NOTES/COMMENTS;



Reach 16



Reach 26



Reach 42US



Reach 42DS

BEREA BYPASS WETLAND REPORT

Item No. 7-192.20

Wetland A is located near STA 127+00. According to the Cowardin classification, Wetland A would be considered a palustrine scrub-shrub drain located between a field and a hillside that is inundated (PSS1C). The total area and area of impact for this project is 0.04 acres. The dominant species are *Acer negundo*, *Arundinaria gigantea*, *Lysimachia nummularia*, and *Fraxinus pennsylvanica*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are facultative (FAC), facultative wetland (FACW), and/or obligate (OBL). The soil belongs to the Huntington silt loam series, which is not on the Madison County hydric soils list. The soil has a matrix color ranges from 10YR 5/2 to 10YR 5/3 and has a mottle color of 10YR 5/4 at a depth of ten to twelve inches. Low matrix chroma and mottling are hydric soil indicators. Wetland hydrology is indicated by soil inundation for an average of one inch, along with the presence of oxidized root channels, water marks, and drift lines. Wetland A drains to an unnamed tributary of Silver Creek and is located within the 100-year floodplain of Silver Creek.

Wetland B is the fringe of a pond located near Johnson Road at STA 190+00. The pond's fringe would be considered palustrine emergent wetland that is saturated (PEM1B). The total area and area of impact is 0.03 acres. The dominant species are *Polygonum punctatum*, *Leersia oryzoides*, *Bidens frondosa*, and *Juncus effusus*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Lawrence silt loam series, which may contain inclusions of hydric soils. The soil matrix color ranges from 2.5Y 7/2 to 2.5Y 7/3 and has a mottle color of 10YR 6/8 at a depth of twelve inches. Low matrix chroma, mottling, and the presence of iron concretions are hydric soil indicators. Wetland hydrology is indicated by soil inundation to a depth of one inch, as well as the presence of oxidized root channels. Wetland B likely drains to an ephemeral tributary of Terrill Branch and is located outside of the 100-year floodplain.

Wetland C is the fringe of an isolated pond located off KY 1617 near STA 222+00. The pond's fringe would be considered palustrine emergent wetland that is saturated/inundated (PEM1B). The total area and area of impact is 0.02 acres. The dominant species are *Juncus effusus*, *Rhexia mariana*, *Typha latifolia*, and *Ludwigia palustris*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Captina silt loam series, which is not on the hydric soils list. The soil has a matrix color of 5Y 5/1 and mottle color of 5Y 6/4 at a depth of twelve inches. Low matrix chroma,

mottling, and the presence of iron and manganese concretions are hydric soil indicators. Wetland hydrology is indicated by soil saturation in the upper twelve inches of soil and soil inundation, as well as the presence of oxidized root channels. Wetland C is located outside of the 100-year floodplain.

Wetland D is the fringe of an isolated pond located off KY 1617 near STA 224+50. The pond's fringe would be considered palustrine emergent wetland that is inundated (PEM1H). The total wetland area and area of impact is 0.02 acres. The dominant species are *Juncus effusus*, *Leersia oryzoides*, and *Sagittaria calycina*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Berea silt loam series, which is not on the hydric soils list. The soil has a matrix color of 10YR 6/1 and mottle color of 10YR 6/3 at a depth of ten inches. Low matrix chroma and abundant mottles are hydric soil indicators. Wetland hydrology is indicated by soil inundation to a depth of several inches. Wetland D is located outside of the 100-year floodplain.

Wetland E is a low spot in a farm field off KY 1617 near STA 250+50. The area would be considered palustrine emergent wetland that is saturated (PEM1B). The area of impact is 0.2 acres. The dominant species are *Eupatorium coelestinum*, *Cyperus strigosus*, *Diodia virginiana*, *Echinochloa crusgalli*, and *Vernonia noveboracensis*. The vegetation is considered hydrophytic since 80 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Lawrence silt loam series, which may contain inclusions of hydric soils. The soil has a matrix color of 2.5Y 6/2 and mottle color of 2.5Y 6/4 at a depth of twelve inches. Low matrix chroma, mottling, and the presence of iron concretions are hydric soil indicators. Wetland hydrology is indicated by soil saturation to the surface. Wetland E drains to an unnamed tributary of Silver Creek and is located outside of the 100-year floodplain.

Wetland F is a pond located off KY 1617 near STA 253+00. The pond, which is covered in duckweed, and vegetated fringe would be considered palustrine emergent wetland that is inundated (PEM1H). The total area and area of impact is 0.02 acres. The dominant species are *Lemna minor*, *Typha latifolia*, *Sagittaria calycina*, and *Polygonum punctatum*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Lawrence silt loam, which may contain inclusions of hydric soils. The soil is gleyed and has a matrix color of N 4/0 at a depth of ten inches. Low matrix chroma and gleying are hydric soil indicators. Wetland hydrology is indicated by soil inundation to a depth of several inches. Wetland F drains to an unnamed tributary of Silver Creek and is located outside of the 100-year floodplain.

Wetland G is a low spot in a farm field off KY 1617 near STA 265+00. The area would be considered palustrine emergent wetland that is saturated (PEM1B). The area of impact is 0.09 acres. The dominant species are *Juncus effusus*, *Cyperus strigosus*, *Echinochloa crusgalli*, and *Xanthium strumarium*. The vegetation is considered hydrophytic since 75 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Lawrence silt loam series, which may contain inclusions of hydric soils. The soil has a matrix color of 2.5Y 7/2 and mottle color of 2.5Y 6/4 at a depth of twelve inches. Low matrix chroma, mottling, and the presence of iron concretions are hydric soil indicators. Wetland hydrology is indicated by soil saturation in the upper twelve inches. Wetland G drains to an unnamed tributary of Silver Creek and is located outside of the 100-year floodplain.

Wetland H is an isolated pond located near the intersection of KY 1617 and Shortline Road at STA 281+75. The pond's fringe and vegetated interior of the pond would be considered palustrine scrub-shrub wetland that is saturated (PSS1B). The total wetland area and area of impact is 0.03 acres. The dominant species are *Juncus effusus*, *Salix nigra*, *Ludwigia palustris*, and *Carex* sp. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Captina silt loam series, which is not on the hydric soils list. The soil has a matrix color of 5Y 6/1 at a depth of twelve inches. Low matrix chroma and mottling are hydric soil indicators. Wetland hydrology is indicated by soil saturation to the surface, along with the presence of oxidized root channels and water-stained leaves. Wetland H is located outside of the 100-year floodplain.

Wetland I is a low spot in an unmaintained field off KY 21 near STA 119+00. The area would be considered palustrine emergent wetland that is saturated (PEM1B). The total area and area of impact is 0.05 acres. The dominant species are *Leersia oryzoides*, *Scirpus atrovirens*, *Fraxinus pennsylvanica*, *Diodia virginiana*, and *Carex frankii*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Lawrence silt loam series, which may contain inclusions of hydric soils. The soil has a matrix color of 2.5Y 6/3 and mottle color of 2.5Y 6/4 at a depth of twelve inches. Low matrix chroma, mottling, and the presence of iron concretions are hydric soil indicators. Wetland hydrology is indicated by soil saturation to the surface and areas of inundation. A connection to the adjacent roadside ditch was not found, therefore, the wetland area may be considered isolated. Wetland I is located outside of the 100-year floodplain.

Wetland J is a drain off KY 21 near STA 124+50. The area would be considered palustrine emergent wetland that is saturated (PEM1B). The total area and area of impact is 0.01 acres. The dominant species are *Leersia oryzoides*, *Polygonum lapathifolium*, *Salix nigra*,

and *Eupatorium coelestinum*. The vegetation is considered hydrophytic since 100 percent of the dominant plants are FAC, FACW, and OBL. The soil belongs to the Captina silt loam series, which is not on the hydric soils list. The soil has a matrix color of 2.5Y 6/4 and mottle color of 2.5Y 6/2 and 2.5 Y 6/5 at a depth of twelve inches. The texture is clayey and contains some sand. The matrix chroma is not low enough to be a hydric soil indicator, but this area likely stays saturated long enough during the growing season to develop hydric soils. Wetland hydrology is indicated by soil saturation to the surface and areas of inundation. Drainage from the surrounding area drains through this wetland to the roadside ditch. Wetland J is located outside of the 100-year floodplain.